RELEASE FOR BID DOCUMENTS

TERMINAL, HANGAR, AND APRON EXPANSION PROJECT

DEFUNIAK SPRINGS MUNICIPAL AIRPORT
CITY OF DEFUNIAK SPRINGS, FL

PREPARED FOR:

CITY OF DEFUNIAK SPRINGS
CITY COUNCIL
71 US HIGHWAY 90 WEST
DEFUNIAK SPRINGS, FL 32433
PHONE: (850) 892-8500

PREPARED BY:

AVCON, INC.
ENGINEERS & PLANNERS
320 BAYSHORE DR, SUITE A
NICEVILLE, FL 32578
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PROJECT FUNDED BY:
FDOT PTGA: 429681-2-94-01
FAA GRANT: 3-12-0018-013-2021

NOVEMBER 2021

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BID DOCUMENTS

DFS TERMINAL, HANGAR, AND APRON EXPANSION

DEFUNIAK SPRINGS AIRPORT

INSTRUCTIONS TO BIDDERS

Owner and Owner's Representative

The Owner as stated herein refers to the **City of DeFuniak Springs**.

The Owner's authorized representative as stated herein refers to the Owner's Consultant, AVCON, INC., herein referred to as Engineer.

Bidder Representations

By submittal of a proposal (bid), the BIDDER represents the following:

- The Bidder has read and thoroughly examined the project documents
- The Bidder has a complete understanding of the terms and conditions required for the satisfactory performance of project work.
- The Bidder has fully informed themselves of the project site, the project site conditions and the surrounding area.
- The Bidder has familiarized themselves of the requirements of working on an operating airport and understands the conditions that may in any manner affect cost, progress or performance of the work
- The Bidder has correlated their observations with that of the project documents.
- The Bidder has found no errors, conflicts, ambiguities or omissions in the project documents, except as previously submitted in writing to the owner that would affect cost, progress or performance of the work.
- The Bidder is familiar with all applicable Federal, State and local laws, rules and regulations pertaining to execution of the contract and the project work.
- The Bidder has complied with all requirements of these instructions and the associated bid documents.

Bid Documents/Project Manual

The bid documents are comprised of the following; Notice-to-Bidders, Instructions-to-Bidders, Proposal Documents, Contract Documents, General Provisions, Special Provisions, Technical Specifications, Geotechnical Investigation, any authorized addenda issued by the Owner and any document incorporated in whole or in part by reference therein.

All documents comprising the Proposal Documents are complementary to one another and together establish the complete terms, conditions and obligations of the successful bidder.

Those individual elements of the Contract Documents that are bound together shall also be referred to as the Project Manual.

Prospective bidders may obtain a copy of the project manual and project drawings from the designated office identified within the Notice-to-Bidders.

Modifications to Project Documents

Modifications to the project documents may only be made by written addendum issued by the Owner or the Engineer. Verbal explanations, interpretations or comments made by the Owner or Owner's representative shall not be binding. Addenda will be transmitted to all known official plan holders. Each bidder shall certify at the time of bid submittal that they acknowledge receipt of all issued addenda.

Errors and Discrepancies in Project Documents

Should Bidder find an error, discrepancy, ambiguity or omission in the project documents prior to submittal of a proposal, the Bidder is obligated to contact the Owner or Engineer with written notice of the error, discrepancy, ambiguity or omission. The written notice shall identify the nature and location of the error, discrepancy, ambiguity or omission. Corrections or modifications to the project documents will only be made by written addendum as prescribed herein. By submittal of a Bid Proposal, Bidder represents that they have thoroughly reviewed the project documents and that they have not identified any error, discrepancy, ambiguity or omission that would affect cost, progress or performance of the project work.

Clarifications and Interpretations

A bidder requiring a clarification or interpretation of the project documents shall make a written request to the Owner or Engineer. The Owner or Engineer must receive the written request a minimum of fourteen (14) calendar days prior to the date of the bid opening.

Interpretations of Estimated Proposal Quantities

An estimate of quantities of work to be done and materials to be furnished under these specifications is stated within the project manual. This estimate is a result of careful calculations and is believed to be correct. The estimated quantities are given only as a basis for comparison of proposals and the award of contract. The Owner does not expressly or impliedly agree that the actual quantities involved will correspond exactly with the estimated quantities. The Bidder shall not plead misunderstandings or deception because of such estimates of quantities, or of the character, location, or other conditions pertaining to the work. Payment to the Contractor will be made only for the actual quantities of work performed or materials furnished in accordance with the plans and specifications. It is understood that the quantities may be increased or decreased as hereinafter provided in the subsection titled "Alteration of Work and Quantities" of the general provisions without in any way invalidating the unit bid prices.

Examination of Plans, Specifications and Site Conditions

As stated within the "Bidder Representations" and reaffirmed herein, the Bidder is expected to carefully examine the site of the proposed work, the proposal, drawings, specifications, terms and conditions of the proposed agreement and the form of agreement. The Bidder shall satisfy themselves as to the character, quality, and quantities of work to be performed, materials to be furnished and as to the requirements of the proposed contract. The submission of a proposal shall be prima facie evidence that the Bidder has made such examination and is satisfied as to the conditions to be encountered in performing the work and as to the requirements of the proposed contract, plans and specifications.

Boring logs and other records of subsurface investigations and tests, as appropriate may be available for inspection by the Bidder. It is understood and agreed that such subsurface information, whether included in the project drawings, specifications or otherwise made available to the Bidder, was obtained and is intended for the owner's design and estimating purposes only. Such information has been made available for the convenience of all bidders. It is further understood and agreed that Bidder is solely responsible for

all assumptions, deductions, or conclusions which he or she may make from his or her examination of the boring logs and other records of subsurface investigations and tests that are furnished by the Owner.

Issuance of Proposal Forms

The Owner reserves the right to refuse to issue a proposal form to a prospective bidder should the bidder be in default for any of the following reasons:

a. Failure to comply with any pre-qualification regulations of the owner, if such regulations are cited or otherwise included, in the proposal as a requirement for bidding.

b. Failure to pay, or satisfactory settle, all bills due for labor and materials on former contracts in force (with the owner) at the time the owner issues the proposal to a prospective bidder.

c. Contractor default under previous contracts with the owner

d. Unsatisfactory work on previous contracts with the owner

Form of Proposal

All bid proposals shall be made on the forms provided by the Owner within the Project Manual, or by Addenda. No bidder may submit more than one proposal. All proposals are to be written in ink and shall be clearly legible. All blank spaces in the proposal forms shall be legibly completed for each and every bid item. The Bidder shall not qualify any bid item. The Bidder shall initial any erasures and alterations made on the proposal form by the bidder.

The Bidder shall state the price of their bid in U.S. dollars and cents in both written and numeral format. In the event of a discrepancy, the written value will take precedence.

Signature of Proposal

The proposal shall be signed and dated by an authorized representative of the Bidder. All signatures shall be made with an ink pen. The Bidder's representative shall have the legal authority to obligate and bind the Bidder to the terms and conditions of the contract. The Bidder shall legibly state the name of the Bidder's representative, the legal name of the Bidder, the address of the Bidder including City, State and Zip Code, and the telephone number of the Bidder.

- For bids by corporations, an officer of the corporation shall sign the bid, the State of incorporation shall be identified and the corporate seal affixed.

- For bids submitted by an agent, evidence of the power of attorney shall be attached to the bid.

- For bids submitted by a partnership or joint venture, the proposal shall identify the name of all firms and the authorized parties of all firms. A copy of the partnership/joint-venture agreement shall be provided to the Owner as an attachment to the proposal.

Modification or Withdrawal of Bid Proposal

Bidder may modify or withdraw their proposal at any point up to the specified time and date identified for receipt of proposals. Any request for bid withdrawal or modification by the Bidder that is received after the specified time and date for receipt of proposals will be returned unopened to the sender.

Any modification to a Bidder's proposal, subject to the time constraint noted herein, must be made on the proposal forms contained in the project manual. The Bidder's authorized representative must sign the modification. The modification shall be placed in a sealed envelope and the statement "Modification to Proposal" shall be legibly marked in the upper left-hand corner. Withdrawal of a proposal may be made, subject to the time constraint noted herein, only with written confirmation under signature of the Bidder.

Bid Guaranty

Each bid proposal shall be accompanied by a bid guaranty in the amount of five percent (5%) of the total amount of the bid. The bid guaranty may be by bid bond or certified check made payable to the Owner. The bid bond shall be from a responsible surety qualified to conduct business within the State of Florida. A certified check shall be issued from a responsible and solvent bank or trust company.

Disadvantage Business Enterprise (DBE)

The requirements of 49 CFR Part 26, Regulations of the U.S. Department of Transportation, apply to this contract. **The Owner has established a DBE contract goal of 15.4 % participation for this contract.** Award of this contract will be conditioned upon satisfying the requirements of this section. The Bidder/Offeror shall make good faith efforts, as defined in Appendix A, 49 CFR Part 26, to subcontract **15.4** % of the dollar value of the prime contract to certified DBE firms as defined in 49 CFR Part 26. These requirements apply to all Bidders/Offerors, including those who qualify as a Disadvantaged Business Enterprise. Per the provisions of Federal Regulation 29 CFR Part 26.55, qualified DBE firms that subcontract work to a non-DBE firm shall deduct the amount of the non-DBE subcontract from the total amount of the DBE participation that counts toward meeting the Owner's DBE participation goal.

All bidders shall submit the following information with their proposal on the forms provided in the project manual:

(1) The names and addresses of Disadvantaged Business Enterprise (DBE) firms that will participate in the contract;

(2) A description of the work that each DBE firm will perform;

(3) The dollar amount of the participation of each DBE firm listed under (1);

(4) Written statement from Bidder/Offeror that attest their commitment to use the DBE firm(s) listed under (1) to meet the owner's project goal;

(5) If Bidder or Offeror cannot meet the advertised project DBE goal; Evidence of good faith efforts undertaken by the Bidder or Offeror, as described in appendix A to 49 CFR Part 26.

The successful Bidder or Offeror must provide written confirmation of participation from each of the DBE firms the Bidder or Offeror list in their commitment. This Bidder or Offeror must submit the DBE's written confirmation of participation within 5 days after bid opening or with the proposal documents as a condition of bid responsiveness.

The requirements of 49 CFR Part 26 apply to this contract. It is a policy of the City of DeFuniak Springs to practice nondiscrimination based on race, color, sex or national origin in the award or performance of this contract. The Owner encourages participation by all firms qualifying under this solicitation regardless of business size or ownership.

Bidder Qualifications

Each Bidder shall furnish the owner satisfactory evidence of their competency and financial capability to perform the proposed work. The Bidder shall demonstrate that they are a responsible firm that possesses the skills, abilities, experience, and integrity to faithfully perform the project work. Evidence of competency shall consist of statements covering the Bidder's past experience on similar work, a listing of plant and equipment immediately available for use on the project, and a listing of key personnel that are available for the project. The listing for plant and equipment shall identify the type, the capacity and the present condition of the item.

Evidence of financial responsibility shall consist of a confidential statement or report of the Bidder's financial resources and liabilities as of the last calendar year. A public accountant must certify such statements and reports. If the Bidder is presently pre-qualified with the State Highway agency, evidence of this pre-qualification may serve as evidence of financial responsibility in lieu of the certified financial statements and reports.

Certification of Offerer/Bidder Regarding Debarment

By submitting a bid/proposal under this solicitation, the bidder or offeror certifies that neither it nor its principals are presently debarred or suspended by any Federal department or agency from participation in this transaction.

Certification of Lower Tier Contractors Regarding Debarment

The successful bidder, by administering each lower tier subcontract that exceeds $25,000 as a "covered transaction", must verify each lower tier participant of a "covered transaction" under the project is not presently debarred or otherwise disqualified from participation in this federally assisted project. The successful bidder will accomplish this by:

1. Checking the System for Award Management at website: http://www.sam.gov

2. Collecting a certification statement similar to the Certificate Regarding Debarment and Suspension (Bidder or Offeror), above.

3. Inserting a clause or condition in the covered transaction with the lower tier contract.

If the FAA later determines that a lower tier participant failed to disclose to a higher tier participant that it was excluded or disqualified at the time it entered the covered transaction, the FAA may pursue any available remedies, including suspension and debarment of the non-compliant participant.

Alternate Bids

Bidder shall complete all blanks provided on the proposal forms. When so permitted by the Owner, the Bidder shall legibly write the statement "No Bid" for those alternate bid options that the Bidder elects not to submit a proposal.

Submission of Bid Proposal

Bidders shall provide two (2) complete copies of the Bid Documents. Proposals shall be sent to arrive at the specified time and date for receipt of bids. Proposals received after the specified time will not receive consideration and will be returned unopened. Proposals shall be enclosed in a sealed opaque envelope. Each proposal shall be addressed to the office location identified in the Notice-to-bidders. The outside of the envelope shall be marked as follows:

Sealed Bid Proposal

Bid of {Insert Name and Address of Bidder}

Proposal for: Terminal, Hangar, and Apron Expansion (22-01-AP)

AIP Project No.: TBD

To be opened at: City of DeFuniak Springs City Hall

For a modification to a previously submitted proposal, insert "Modification to Proposal" in place of "Sealed Bid Proposal."

The envelope shall contain a signed original of the following forms found in the Project Manual:

SECTION	CONTENTS
B1	Proposal Form (in separate sealed envelope)
B2	Equal Employment Opportunity Report Statement
B3	Bidder's Qualifications
B4	Disadvantaged Business Enterprise (DBE) Utilization Statement
B4	Disadvantaged Business Enterprise (DBE) Letter of Intent
B5	Proposal Bond
B6	Buy American Preference
B7	Certification of Non-Segregated Facilities
B8	Public Entity Crime Affidavit
B9	General Civil Rights Provision
B10	Clean Air and Water Pollution Control
B11	Lobbying
B12	Procurement of Recovered Material
B13	Insurance Requirements

Bid Opening

All proposals submitted prior to the stated time and date for receipt of bids will be publicly opened and read aloud by the Owner or the Owner's representative. Bidders, their authorized agents, and other interested parties are invited to attend. Proposals submitted after the stated time and date for receipt of bids will be automatically rejected without consideration and will be returned unopened.

Evaluation of Proposals

Proposals may be held by the Owner for purposes of review and evaluation by the Owner for a period not to exceed **90** calendar days from the stated date for receipt of bids. The Owner will tabulate all bids and

verify proper extension of unit costs. The Bidder shall honor their proposal for the duration of this period of review and evaluation. The bid guaranty will be held by the Owner until this period of review has expired or a contract has been formally executed.

Bid Informalities and Irregularities

The Owner reserves the right to waive any informality or irregularity discovered in any proposal, which in the owner's judgment best serves the Owner's interest. In the situation where an extension of a unit price is found to be incorrect, the stated unit price and correct extension will govern. In the event of a discrepancy between the written and numeral values, the written value shall take precedence.

Irregular Proposals

Proposals meeting the following criteria are subject to consideration as being irregular:

1. If the proposal is on a form other than that furnished by the Owner or Owner's representative.

2. If the form furnished by the Owner or Owner's representative is altered from the original document.

3. If there are unauthorized additions, conditional or alternate pay items or irregularities of any kind that make the proposal incomplete, indefinite, or otherwise ambiguous.

4. If the proposal does not contain a unit price for each pay item listed in the proposal, except in the case of authorized pay items, for which the Bidder is not required to furnish a unit price.

5. If the proposal contains unit prices that are obviously unbalanced.

6. If the proposal is not accompanied by the bid guarantee specified herein.

Disqualification of Bid Proposals

The Owner reserves the right to reject any or all bids, as determined to be in the best interest of the Owner.

Causes for rejection of proposals include but are not limited to:

- Submittal of an irregular proposal;

- Submittal of more than one proposal from the same partnership, firm or corporation;

- Failure by Bidder to submit the bid prior to the stated time and date for receipt of bids;

- Failure by Bidder to furnish satisfactory bid guarantee;

- Failure by Bidder to provide all information required of the bid forms;

- Failure by Bidder to comply with the requirements of bid instructions;

- Failure by the Bidder to demonstrate good faith efforts in obtaining participation by certified DBE firms;

- Determination by the Owner that Bidder is not qualified to accomplish the project work;
- Determination by the Owner that the Bidder has placed conditions on or qualified their proposal;
- Discovery of any alteration, interlineations or erasure of any project requirement by the Bidder;
- Inclusion of the Bidder on the "Excluded Parties Listing System" as maintained and published by the General Services Administration;
- Evidence of collusion among bidders.

Cancellation of Award
At any time prior to execution of a contract agreement, the Owner reserves the right to cancel the award for any reason without liability to the Bidder, apart from the return of the bid guaranty, at any time prior to execution of the contract.

Notice of Award of Contract
It is the intent of the Owner, after a period of review and evaluation, to award a contract to the responsible bidder that submits the lowest responsive proposal. The successful bidder will be informed their bid has been accepted through the Owner's issuance of a Notice-of-Award. The Notice-of-Award shall not be construed as a binding agreement. The proper execution of a contract agreement shall serve as the binding agreement.

Award of Alternates
Unless specifically stated, the Owner reserves the right to accept alternates in any order or combination, which in the judgment of the Owner, best serves the Owner's interest.

Return of Bid Guaranty
The bid guaranty of the successful Bidder will be returned upon successful execution of the contract documents as specified herein. Failure by the successful Bidder to execute the contract documents within the specified time shall result in forfeiture of the bid guaranty. The bid guaranty of the second and third lowest responsible bidders will be retained for a period of 60 days pending the execution of the contract documents by the successful bidder.

Except as noted above, the bid guaranty of unsuccessful bidders will be returned at the point their proposal is rejected.

Contract Agreement
The successful Bidder shall execute the contract agreement in accordance with the accepted bid proposal within ten (10) calendar days of the date of the Notice-of-Award. Failure to execute the contract agreement within the specified time frame may result in the bid being awarded to the next low bidder and shall result in the forfeiture of the Bidder's bid guarantee as a liquidated damage.

Performance and Payment Bonds
The successful Bidder shall furnish separate performance and payment bonds each in the amount of 100% of the contract price. The bonds shall be made payable to the Owner as security for faithful performance of the contract and for the payment of all persons, firms or corporations to whom the Bidder may become legally indebted for labor, materials, tools, equipment or services in the performance of the project work.

The form of the bond shall be that provided within the project manual. The current power of attorney for the person signing the bond as a representative of the surety shall be attached to the bonds.

The executed bonds shall be delivered to the Owner within ten (10) calendar days from the date of contract execution. Bonds should not be executed prior to execution of the contract agreement. The bonds shall be issued by a solvent Surety, which is certified to operate within the State the project work is located and which is listed in the current issue of the U.S. Treasury Circular 570. If specifically requested by the Owner, the successful Bidder shall obtain and submit information on the surety's financial strength rating.

Certificates of Insurance

The successful Bidder shall furnish to the Owner all required certificates of insurance as specified within the project manual.

Approval of the Contract

Upon receipt of the Contract Agreement, Contract Bonds and Certificate of Insurance as executed by the successful Bidder, the Owner will complete execution of the contract conditioned upon the Owner's judgment that it remains in their best interest to enter into the Agreement.

Delivery of the fully executed Contract Agreement to the successful Bidder shall constitute the Owner's approval to be bound by the successful Bidder's proposal and all terms and conditions of the Contract Agreement.

Upon satisfactory execution of the contract by the successful Bidder and the Owner, all references to "Bidder" in the bid documents become equivalent to the term "Contractor".

END OF SECTION ITB

PROPOSAL DOCUMENTS

BID DOCUMENTS

DFS TERMINAL, HANGAR, AND APRON EXPANSION
DEFUNIAK SPRINGS AIRPORT

CITY OF DEFUNIAK SPRINGS, FLORIDA

TERMINAL, HANGAR, AND APRON EXPANSION
at
DEFUNIAK SPRINGS AIRPORT
CITY OF DEFUNIAK SPRINGS, FLORIDA

AIP Project No. TBD
FDOT PTGA No. 429681-2-94-01

BID FORM

TO: Owner City of DeFuniak Springs
DeFuniak Springs Airport
71 US Highway 90 West,
DeFuniak Springs, Florida 32433

FROM: Bidder _____

Address _____

City/State/Zip _____

DATE: _____

1. The undersigned hereby certifies that he/she has examined the form of contract, plans and specifications, and other associated Contract Document for the **Terminal, Hangar, and Apron Expansion** project, copies of which are on file at the DeFuniak Springs Airport, 71 US Highway 90 West, DeFuniak Springs Airport, Florida 32433. The undersigned further certifies that he/she has examined the site of the work, has determined for himself/herself the conditions affecting the work and subject to acceptance of the proposal, agrees to provide at his/her expense, all labor, insurance, superintendence, machinery, plant, equipment, tools, apparatus, appliances, and means of construction, and all materials and supplies complete the entire work, including work incidental thereto, in conformance with the plans, specifications, and associated contract documents.

2. The undersigned acknowledges that the Contract Documents consist of the Invitation for Bid, Instruction to Bidders, all issued Addenda, Proposal, Statement of Qualifications, Anticipated Sub-Contracts, Form of Proposal Guaranty, Notice of Award, Contract Agreement, Performance & Payment bonds, Notice to Proceed, Notice of Contractor's Settlement, Wage Rates, General Provisions, Special Provisions, Plans, Technical Specifications, attached appendices and referenced documents.

3. The undersigned, in compliance with the Notice to Bidders / Invitation for Bids, hereby proposes to do the work called for in said contract and specifications and shown on said plans and to furnish all materials, tools, labor, and all appliances and appurtenances necessary for the said work at the following rates and prices:

4. The undersigned understands that the above quantities of work to be done are approximate only and are intended principally to serve as a guide in evaluating the bids.

   The contract will be awarded on the basis of the total bid amount shown on the Bid Schedule for the combination of alternates ultimately awarded by the City of DeFuniak Springs.

   In the event any discrepancy exists between unit prices and total amount shown on the Standard Form of Bid, the unit prices shall govern.

5. It is understood that the schedule of minimum wage rates, as established by the Secretary of Labor and included in the Specifications, are to govern on this project, and the undersigned certifies that he or she has examined this schedule of wage rates and that the prices bid are based on such established wage rates.

6. The undersigned prime contractor, if not a certified DBE, hereby assures that they will make sufficient and reasonable efforts to meet the DBE goals, that they will subcontract **_15.4_ percent** of the dollar value of the prime contract to DBE firms, and that they will include the DBE clauses required by the sponsor's DBE Program in all subcontracts which offer subcontracting opportunities. The undersigned will complete and submit with the bid the attached DBE Participation Form, including a demonstration of a good faith effort if the DBE goal is not met.

7. The undersigned acknowledges a non-mandatory pre-bid meeting was held for this project.

8. The undersigned agree upon written notice of the acceptance of this bid, within one hundred twenty (120) days after the opening of the bids, that he or she will execute the contract in accordance with the bid as accepted and give contract (Performance and Payment) bond on attached forms within ten (10) days after the prescribed forms are presented for signature.

   If awarded the contract, the undersigned agrees to commence and complete the construction in compliance with the terms stated in the Notice to Bidders / Invitation for Bids. The undersigned agrees to accept as full payment for the completed construction work an amount equal to the total of the prices as hereinafter set forth, subject to adjustments due to changes as may be officially ordered during the progress of the work.

9. The undersigned agrees that if awarded the contract, the work of construction shall be started not later than 10 days after receipt by the Contractor of the Notice to Proceed and shall be substantially complete within 420 calendar days, subject to any extension of time that may be granted by the City of DeFuniak Springs. Failure to complete the work within the time period allowed shall subject the Contractor to the liquidated damages as defined in Special Provision 13.

10. As an evidence of good faith in submitting this proposal, the undersigned encloses a certified check or proposal bond in the amount of 5% of bid which, in case the undersigned refuses or fails to accept an award and to enter into a contract and file the required bonds within the prescribed time, shall be forfeited to the City of DeFuniak Springs, as liquidated damages.

11. The undersigned certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The

undersigned certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments and that he will not permit his employees to perform their services at any location under his control, where segregated facilities are maintained. The undersigned agrees that a breach of this certification is a violation of the Equal Opportunity Clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin, because of habit, local custom, or any other reason. The undersigned agrees that (except where he has obtained identical certifications from proposed subcontractor for specific time periods) he will obtain identical certifications from proposed subcontractors prior to award of subcontracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity Clause, and that he will retain such certifications in his files.

12. It is a condition of this contract, and shall be made a condition of each subcontract entered into pursuant to this contract, that the contractor and any subcontractor shall not require any laborer or mechanic employed in performance of the contract to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health or safety, as determined under Construction Safety and Health Standard (Title 29 Code of Federal Regulation, Part 1518) (36 F.R. 7340) promulgated by the United States Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act, (82 Stat. 96).

13. By entering into this contract, the Contractor certifies that neither it (nor he/she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

14. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or CFR 5.12(a)(1).

15. The undersigned hereby declares that the only parties interested in this proposal are named herein, that this proposal is made without collusion with any other person, firm, or corporation, that no member of the City of DeFuniak Springs, officer or agent of the City of DeFuniak Springs or DeFuniak Springs Airport, is directly or indirectly financially interested in this bid.

16. The undersigned hereby acknowledges the following limitations to requesting payment for this project:

1) The maximum amount the undersigned may request payment for prior to September 1, 2022 is $3,590,000.

2) The maximum amount the undersigned may request payment for prior to September 1, 2023 is undersigned may request $5,150,000.

3) The undersigned may request payment exceeding $5,150,000 after September 1, 2023.

17. The undersigned acknowledges receipt of the following Addenda:

Addendum No.: _____ Date Received _____

Addendum No.: _____ Date Received _____

Addendum No.: _____ Date Received: _____

Addendum No.: _____ Date Received: _____

BID SCHEDULE - UNIT PRICES

CONTRACTOR: _____ **DATE**: _____

PROJECT NAME: Terminal, Hangar, and Apron Expansion

Base Bid – Terminal Building

Bid Item No.	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Total Amt./ Item
1	C-105-1	Mobilization	LS	1		
2	TB-1	Terminal Building, Complete	LS	1		

BASE BID: For all work required to perform the work specified in the Base Bid above in accordance with the construction drawings, specifications, and other contract documents, including all costs related to the work, and any required permits, taxes, bonds and insurance, the undersigned submits a total amount of:

TOTAL BASE BID (amount in words):

_____

_____dollars

and _____cents

($_____)
(amount in numbers)

Note: Total Base Bid amount shall equal the sum of the totals for Bid Items No. 1 and 2.

Additive Alternate No. 1 – Main Entry Covered Canopy at Drop-Off

Bid Item No.	Item No.	Item Description & Unit Price In Words	Unit	Estimated Quantity	Unit Price	Total Amt./ Item
1	C-105-1	Mobilization	LS	1		
2	CC-1	Main Entry Covered Canopy at Drop-Off	LS	1		

ADDITIVE ALTERNATE NO. 1: For all work required to perform the work specified in Additive Alternate No. 1 above in accordance with the construction drawings, specifications, and other contract documents, including all costs related to the work, and any required permits, taxes, bonds and insurance, the undersigned submits a total amount of:

TOTAL ADDITIVE ALTERNATE NO. 1 BID (amount in words):

_____

_____dollars

and _____cents

($_____)
(amount in numbers)

Note: Total Additive Alternate No. 1 bid amount shall equal the sum of the totals for Bid Items No. 1 and 2.

Additive Alternate No. 2 – Courtyard Enclosure Elements

Bid Item No.	Item No.	Item Description & Unit Price In Words	Unit	Estimated Quantity	Unit Price	Total Amt./ Item
1	C-105-1	Mobilization	LS	1		
2	CE-1	Courtyard Enclosure Elements	LS	1		

ADDITIVE ALTERNATE NO 2: For all work required to perform the work specified in Additive Alternate No. 2 above in accordance with the construction drawings, specifications, and other contract documents, including all costs related to the work, and any required permits, taxes, bonds and insurance, the undersigned submits a total amount of:

TOTAL ADDITIVE ALTERNATE NO. 2 (amount in words):

_____

_____dollars

and _____cents

($_____)
(amount in numbers)

Note: Total Additive Alternate No. 2 bid amount shall equal the sum of the totals for Bid Items No. 1 and 2.

Additive Alternate No. 3 – Landside Site Work Beyond the Building Pad

Bid Item No.	Item No.	Item Description & Unit Price In Words	Unit	Estimated Quantity	Unit Price	Total Amt./ Item
1	C-102-1	Erosion & Pollution Control	LS	1		
2	C-105-1	Mobilization	LS	1		
3	C-105-2	Maintenance of Traffic	LS	1		
4	P-101-1	Miscellaneous Pavement Removal	SY	825		
5	P-151-1	Stripping	SY	11,400		
6	P-152-1	Excavation and Embankment	LS	1		
7	P-152-2	Subgrade Preparation (LBR 40)	SY	2,000		
8	P-154-1	Stabilized Subbase Course (12”)	SY	1,900		
9	P-209-1	8” Crushed Aggregate Base Course	SY	1,800		
10	P-401-1	2” Bituminous Surface Course, 76-22 Binder	TN	190		
11	D-701-2	24” ADS, N-12	LF	350		
12	D-751-1	Type F DBI	EA	4		
13	F-162-1	7’ + 1’ AOA Fence	LF	1,670		
14	F-162-4	24’ Automatic Sliding Gate, 7’ + 1’	EA	1		
15	T-904-1	Sodding, Bahia Argentina	SY	8,300		
16	520-2	Concrete Curb & Gutter, Type RA	LF	750		
17	520-3	Sidewalk Integral Curb	LF	280		
18	522-1	PCC Sidewalk	SY	225		
19	522-2	PCC Dumpster Pad	EA	1		
20	700-1	Vehicular Signage	LS	1		
21	710-1	Landside Pavement Markings	LS	1		
22	02660-1	Potable Water Improvements	LS	1		
23	02730-1	Sanitary Sewer Improvements	LS	1		
24	WH-1	Wheel Stops	EA	20		
25	AL-1	Lobby Seating, Conference Room Seating and Palm Trees	AL	1	$140,000	$140,000

Bid Item No.	Item No.	Item Description & Unit Price In Words	Unit	Estimated Quantity	Unit Price	Total Amt./ Item
26	AL-2	Permitting and Connection Impact Fees	AL	1	$85,000	$85,000
27	AL-3	Gulf Power Allowance	AL	1	$20,000	$20,000
28	AL-4	Telecommunications Allowance	AL	1	$10,000	$10,000

ADDITIVE ALTERNATE NO. 3: For all work required to perform the work specified in Additive Alternate No. 3 above in accordance with the construction drawings, specifications, and other contract documents, including all costs related to the work, and any required permits, taxes, bonds and insurance, the undersigned submits a total amount of:

TOTAL ADDITIVE ALTERNATE NO. 3 BID (amount in words):

_____

_____dollars

and _____cents

($_____)
(amount in numbers)

Note: Total Additive Alternate No. 3 bid amount shall equal the sum of the totals for Bid Items No. 1 through 28.

Additive Alternate No. 4 – Hangar Building

Bid Item No.	Item No.	Item Description & Unit Price In Words	Unit	Estimated Quantity	Unit Price	Total Amt./ Item
1	C-105-1	Mobilization	LS	1		
2	HB-1	Hangar Building, Complete	LS	1		

ADDITIVE ALTERNATE NO. 4: For all work required to perform the work specified in Additive Alternate No. 4 above in accordance with the construction drawings, specifications, and other contract documents, including all costs related to the work, and any required permits, taxes, bonds and insurance, the undersigned submits a total amount of:

TOTAL ADDITIVE ALTERNATE NO. 4 (amount in words):

_____

_____dollars

and _____cents

($_____)
(amount in numbers)

Note: Total Additive Alternate No. 4 bid amount shall equal the sum of the totals for Bid Items No. 1 and 2.

Additive Alternate No. 5 – Barn Door in Lieu of Glass Door and Wall

Bid Item No.	Item No.	Item Description & Unit Price In Words	Unit	Estimated Quantity	Unit Price	Total Amt./ Item
1	BD-1	Barn Door in Lieu of Glass Door and Wall	LS	1		

ADDITIVE ALTERNATE NO. 5: For all work required to perform the work specified in Additive Alternate No. 5 above in accordance with the construction drawings, specifications, and other contract documents, including all costs related to the work, and any required permits, taxes, bonds and insurance, the undersigned submits a total amount of:

TOTAL ADDITIVE ALTERNATE NO. 5 BID (amount in words):

_____

_____dollars

and _____cents

($_____)
(amount in numbers)

Note: Total Additive Alternate No. 5 bid amount shall equal the sum of the total for Bid Item No. 1.

Additive Alternate No. 6 – Apron Site Work

Bid Item No.	Item No.	Item Description & Unit Price In Words	Unit	Estimated Quantity	Unit Price	Total Amt./ Item
1	C-102-1	Erosion & Pollution Control	LS	1		
2	C-105-1	Mobilization	LS	1		

Bid Item No.	Item No.	Item Description & Unit Price In Words	Unit	Estimated Quantity	Unit Price	Total Amt./ Item
3	C-105-2	Maintenance of Traffic	LS	1		
4	P-151-1	Clearing and Grubbing	SY	12,600		
5	P-152-1	Excavation and Embankment	LS	1		
6	P-152-2	Subgrade Preparation (LBR 40)	SY	5,700		
7	P-154-1	Stabilized Subbase Course (12”)	SY	5,400		
8	P-209-1	8” Crushed Aggregate Base Course	SY	5,100		
9	P-401-2	4” Bituminous Surface Course, 76-22 Binder	TN	1,060		
10	P-620-1	Apron Pavement Markings	LS	1		
11	D-701-1	18” RCP, Class III	LF	190		
12	D-701-3	36” RCP, Class III	LF	310		
13	D-701-4	42” RCP, Class III	LF	110		
14	D-701-5	42” MES with 15’ x 15’ Rip Rap	EA	1		
15	D-751-2	Type F DBI, Aircraft Rated	EA	2		
16	D-751-3	Type G DBI, Aircraft Rated	EA	2		
17	D-751-4	Type F Top, Type J Alt A (8’-0” dia) Bottom, Aircraft Rated	EA	1		
18	TD-1-1	A-I Aircraft Tie Down Anchor Assembly (3 anchor points)	EA	5		

Bid Item No.	Item No.	Item Description & Unit Price In Words	Unit	Estimated Quantity	Unit Price	Total Amt./ Item
19	TD-1-2	B-II Aircraft Tie Down Anchor Assembly (3 anchor points)	EA	1		
20	T-904-1	Sodding, Bahia Argentina	SY	7,400		

ADDITIVE ALTERNATE NO. 6: For all work required to perform the work specified in the Base Bid above in accordance with the construction drawings, specifications, and other contract documents, including all costs related to the work, and any required permits, taxes, bonds and insurance, the undersigned submits a total amount of:

TOTAL ADDITIVE ALTERNATE NO. 6 (amount in words):

_____

_____dollars

and _____cents

($_____)
(amount in numbers)

Note: Total Additive Alternate No. 6 bid amount shall equal the sum of the totals for Bid Items No. 1 through 20.

Additive Alternate No. 7 – Taxiway Connector Widening Site Work

Bid Item No.	Item No.	Item Description & Unit Price In Words	Unit	Estimated Quantity	Unit Price	Total Amt./ Item
1	C-102-1	Erosion & Pollution Control	LS	1		
2	C-105-1	Mobilization	LS	1		
3	C-105-2	Maintenance of Traffic	LS	1		
4	P-151-1	Clearing and Grubbing	SY	4,100		
5	P-152-1	Excavation and Embankment	LS	1		

Bid Item No.	Item No.	Item Description & Unit Price In Words	Unit	Estimated Quantity	Unit Price	Total Amt./ Item
6	P-152-2	Subgrade Preparation (LBR 40)	SY	2,100		
7	P-154-1	Stabilized Subbase Course (12”)	SY	2,000		
8	P-209-1	8” Crushed Aggregate Base Course	SY	1,900		
9	P-401-2	4” Bituminous Surface Course, 76-22 Binder	TN	390		
10	P-620-2	Taxiway Connector Pavement Markings	LS	1		
11	T-904-1	Sodding, Bahia Argentina	SY	600		
12	SP-104-1	Temporary Power & Temporary Airfield Lighting/Signage/Navigational Facilities	LS	1		
13	SP-105-1	Electrical Demolition	LS	1		
14	L-108-1	1/C L-824 Type C Unshielded #8 AWG 5 KV Stranded Copper Cable, Installed	LF	2,500		
15	L-108-2	1/C #2 AWG Solid Copper Counterpoise Cable, Installed Over Duct or Conduit	LF	2,000		
16	L-108-3	0.75” Diameter by 10.00’ Long Copper Clad Steel Sectional Ground Rod	EA	70		
17	L-110-1	1 Way 2” Schedule 40 PVC Direct Buried Duct	LF	1,850		
18	L-110-2	1 Way 2” Schedule 40 PVC Concrete Encased Duct	LF	150		
19	L-110-3	1 Way 4” Split Duct	LF	100		
20	L-125-2	L-858(L) Sign – Single/Double Face, LED, Size 2 – 2 Module	EA	1		

Bid Item No.	Item No.	Item Description & Unit Price In Words	Unit	Estimated Quantity	Unit Price	Total Amt./ Item
21	L-125-3	L-858(L) Sign – Single/Double Face, LED, Size 2 – 4 Module	EA	2		
22	L-125-1	L-861T(L) Omnidirectional, Blue, LED, Taxiway Edge Light	EA	21		

ADDITIVE ALTERNATE NO. 7 BID: For all work required to perform the work specified in Additive Alternate No. 7 above in accordance with the construction drawings, specifications, and other contract documents, including all costs related to the work, and any required permits, taxes, bonds and insurance, the undersigned submits a total amount of:

TOTAL ADDITIVE ALTERNATE NO. 7 BID (amount in words):

_____

_____dollars

and _____cents

($_____)
(amount in numbers)

Note: Total Additive Alternate No. 7 bid amount shall equal the sum of the totals for Bid Items No. 1 through 22.

BID SUMMARY

(A) BASE BID – TERMINAL BUILDING: $_____

(B) ADD. ALTERNATE 1: MAIN ENTRY COVERED CANOPY AT DROP-OFF $_____

(C) ADD. ALTERNATE 2: COURTYARD ENCLOSURE ITEMS $_____

(D) ADD. ALTERNATE 3: LANDSIDE SITE WORK BEYOND BUILDING PAD $_____

(E) ADD. ALTERNATE 4: HANGAR BUILDING $_____

(F) ADD. ALTERNATE 5: BARN DOOR IN LIEU OF GLASS DOOR AND WALL $_____

(G) ADD. ALTERNATE 6: APRON SITE WORK $_____

(H) ADD. ALTERNATE 7: TAXIWAY CONNECTOR WIDENING SITE WORK $_____

(I) TOTAL BID AMOUNT*: $_____

** The Total Bid Amount (I) shall equal the sum of (A) through (H). The Basis of Award shall be based on the lowest total of either the Base Bid or combinations of the total of the Base Bid and any Bid Alternatives, as finally determined by the owner and the funding agencies based on the availability of funding.*

The Bidder represents that it has examined the site of the Work and informed itself fully in regard to all conditions pertaining to the place where the work is to be done; that it has examined the plans and specifications for the work and other Contract Documents relative thereto and has read all of the Addenda furnished prior to the ope2021ning of the Bids, as acknowledged below; and that it has otherwise fully informed itself regarding the nature, extent, scope and details of the Work to be performed.

If provided with a Notice of Intent to Award the Contract by the Owner, the Bidder shall execute and deliver to the Owner all of the documents required by the Contract Documents, including but not limited to, the Addendum to the Agreement and the Performance and Payment Bonds in the form contained in the Contract Documents, furnish the required evidence of the specified insurance coverages, furnish all necessary permits, license, materials, equipment, machinery, maintenance, tools, apparatus, means of transportation and labor necessary to complete the Work.

Dated and signed this _____ day of _____, 2021.

SIGNATURE OF BIDDER:

By _____
Name and Title of Authorized Agent

_____
Name of Company

Address of Company

City, State, Zip Code

Telephone Number of Company

Federal ID No. or SS No.

EQUAL EMPLOYMENT OPPORTUNITY REPORT STATEMENT
As Required by 41 CFR 60-1.7(b)

The bidder (proposer) shall complete the following statement by checking the appropriate boxes. Failure to complete these blanks may be grounds for rejection of bids.

1. The bidder (proposer) has _____ has not _____ developed and has on file at each establishment Affirmative Action Programs pursuant to 41 CFR 60-1.4 and 41 CFR 60-2.

2. The bidder (proposer) has _____ has not _____ participated in any previous contract or subcontract subject to the Equal Opportunity Clause prescribed by Executive Order 11246, as amended.

3. The bidder (proposer) has _____ has not _____ filed with the Joint Reporting Committee the annual compliance report on Standard Form 100 (EEO-1 Report).

4. The bidder (proposer) does _____ does not _____ employ fifty (50) or more employees.

_____
(Name of Bidder)

BY: _____
(Signature)

TITLE: _____

DATE: _____

NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

2. The goals and timetables for minority and female participation, expressed in percentage terms for the contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Timetables

Goals for minority participation for each trade: 15.4%
Goals for female participation in each trade: 6.9%

These goals are applicable to all of the contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and non-federally involved construction.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs (OFCCP) within 10 working days of award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.

4. As used in this notice and in the contract resulting from this solicitation, the "covered area" is Florida, Walton County and City of DeFuniak Springs.

Construction: AIP funded construction work contracts and subcontracts that exceed $10,000. Construction work means construction, rehabilitation, alteration, conversion, extension, demolition or repair of buildings, highways, or other changes or improvements to real property, including facilities providing utility services. The term also includes the supervision, inspection, and other onsite functions incidental to the actual construction.

EQUAL OPPORTUNITY CLAUSE

During the performance of this contract, the contractor agrees as follows:

1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identify or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

2. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, or national origin.

3. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

4. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

5. The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

6. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

7. The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance*: Provided, however*, That in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the contractor may request the United States to enter into such litigation to protect the interests of the United States.

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY
CONSTRUCTION CONTRACT SPECIFICATIONS

1. As used in these specifications:

   a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;

   b. "Director" means Director, Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, or any person to whom the Director delegates authority;

   c. "Employer identification number" means the Federal social security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941;

   d. "Minority" includes:

      (1) Black (all) persons having origins in any of the Black African racial groups not of Hispanic origin);

      (2) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin regardless of race);

      (3) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

      (4) American Indian or Alaskan native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors shall be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved Plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The contractor shall implement the specific affirmative action standards provided in paragraphs 7a through 7p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in a geographical area where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement nor the failure by a union with whom the contractor has a collective bargaining agreement to refer either minorities or women shall excuse the contractor's obligations under these specifications, Executive Order 11246 or the regulations promulgated pursuant thereto.

6. In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees shall be employed by the contractor during the training period and the contractor shall have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees shall be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The contractor shall document these efforts fully and shall implement affirmative action steps at least as extensive as the following:

    a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the contractor's employees are assigned to work. The contractor, where possible, will assign two or more women to each construction project. The contractor shall specifically ensure that all foremen, superintendents, and other onsite supervisory personnel are aware of and carry out the contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

c. Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the contractor by the union or, if referred, not employed by the contractor, this shall be documented in the file with the reason therefore along with whatever additional actions the contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions with which the contractor has a collective bargaining agreement has not referred to the contractor a minority person or female sent by the contractor, or when the contractor has other information that the union referral process has impeded the contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the contractor's employment needs, especially those programs funded or approved by the Department of Labor. The contractor shall provide notice of these programs to the sources compiled under 7b above.

f. Disseminate the contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with onsite supervisory personnel such a superintendents, general foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the contractor's EEO policy with other contractors and subcontractors with whom the contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students; and to minority and female recruitment and training organizations serving the contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the contractor shall send written notification to organizations, such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a contractor's workforce.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel, for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are non-segregated except that separate or single user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations, which assist in fulfilling one or more of their affirmative action obligations (7a through 7p). The efforts of a contractor association, joint contractor union, contractor community, or other similar groups of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through 7p of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the contractor. The obligation to comply, however, is the contractor's and failure of such a group to fulfill an obligation shall not be a defense for the contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, if the particular group is employed in a substantially disparate manner (for example, even though the contractor has achieved its goals for women generally,) the contractor may be in violation of the Executive Order if a specific minority group of women is underutilized.

10. The contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

11. The contractor shall not enter into any subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination, and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any contractor who CFR Part 60-3. fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee, the name, address, telephone number, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

FEDERAL FAIR LABOR STANDARDS ACT (FEDERAL MINIMUM WAGE)

All contracts and subcontracts that result from this solicitation incorporate by reference the provisions of 29 CFR part 201, the Federal Fair Labor Standards Act (FLSA), with the same force and effect as if given in full text. The FLSA sets minimum wage, overtime pay, recordkeeping, and child labor standards for full and part time workers.

The *contractor* has full responsibility to monitor compliance to the referenced statute or regulation. The *contractor* must address any claims or disputes that arise from this requirement directly with the U.S. Department of Labor – Wage and Hour Division

PROHIBITION of SEGREGATED FACILITIES

(a) The Contractor agrees that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Contractor agrees that a breach of this clause is a violation of the Equal Opportunity clause in this contract.

(b) "Segregated facilities," as used in this clause, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees, that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex, or national origin because of written or oral policies or employee custom. The term does not include separate or single-user rest rooms or necessary dressing or sleeping areas provided to assure privacy between the sexes.

(c) The Contractor shall include this clause in every subcontract and purchase order that is subject to the Equal Opportunity clause of this contract.

OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

All contracts and subcontracts that result from this solicitation incorporate by reference the requirements of 29 CFR Part 1910 with the same force and effect as if given in full text. Contractor must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to the employee. The Contractor retains full responsibility to monitor its compliance and their subcontractor's compliance with the applicable requirements of the Occupational Safety and Health Act of 1970 (20 CFR Part 1910). Contractor must address any claims or disputes that pertain to a referenced requirement directly with the U.S. Department of Labor – Occupational Safety and Health Administration.

BIDDERS QUALIFICATIONS

Each bidder shall furnish with his bid the following completed and signed statements on "evidence of competency" and "evidence of financial responsibility" in accordance with General Provision 20-02. In addition, the Owner reserves the right to conduct such additional investigation into the competency and responsibility of the bidders (or any particular bidder) as the Owner may deem necessary.

1. Name of Bidder: _____
2. Business address: _____
3. Telephone number: _____
4. When organized: _____
5. Where incorporated: _____
6. How many years have you been engaged in the contracting business under the present firm name?

   _____
7. What is the type of construction work in which you are principally engaged?

   _____
8. On separate sheet, list major contracts in past ten years.
9. On separate sheet, list equipment and plant available for this project.
10. Enclose evidence of financial responsibility per General Provisions Section 20-02.
11. Credit available for this Contract $_____
12. On a separate sheet, list all projects presently under Contract by name, gross amount, and percent complete.
13. Have you ever refused to sign a Contract at your original bid? _____
14. Have you ever been declared in default on a Contract? _____
15. Total amount of bonding capacity $_____
16. Total bonding capacity available for the project $_____
17. Remarks: _____

    _____

    _____

(The above statements must be subscribed and sworn to before a Notary Public.)

Date: _____

Firm Name: _____

By: _____
(Signature)

Title: _____

STATE OF _____

COUNTY OF _____

Subscribed and sworn to before me, a Notary Public, in and for the County and State aforesaid by _____ duly authorized so to sign this _____ day of _____, 2020.

Notary Public

My Commission Expires: _____

END OF SECTION B3

Disadvantage Business Enterprise
UTILIZATION STATEMENT

The undersigned bidder/offeror has satisfied the requirements of the bid specification in the following manner. (*Please mark the appropriate box*)

☐ **The bidder/offeror is committed to a minimum of 15.4 % DBE utilization on this contract.**

☐ **The bidder/offeror, while unable to meet the DBE goal of 15.4 %, hereby commits to a minimum of _____% DBE utilization on this contract and also submits documentation, as an attachment, demonstrating good faith efforts (GFE).**

The undersigned hereby further assures that the information included herein is true and correct, and that the DBE firm(s) listed herein have agreed to perform a commercially useful function in the work items noted for each firm. The undersigned further understands that no changes to this statement may be made without prior approval from the Civil Right Staff of the Federal Aviation Administration.

_____
Bidder's/Offeror's Firm Name

_____ _____
Signature Date

DBE UTILIZATION SUMMARY

	Contract Amount		**DBE Amount**	**Contract Percentage**
DBE Prime Contractor	$_____	x 1.00 =	$_____	_____%
DBE Subcontractor	$_____	x 1.00 =	$_____	_____%
DBE Supplier	$_____	x 0.60 =	$_____	_____%
DBE Manufacturer	$_____	x 1.00 =	$_____	_____%
Total Amount DBE			$_____	_____%
DBE Goal			$_____	_____%

* If the total proposed DBE participation is less than the established DBE goal, Bidder must provide written documentation of the good faith efforts as required by 49 CFR Part 26.

Disadvantage Business Enterprise
LETTER OF INTENT
(This page shall be submitted for each DBE firm)

Bidder/Offer Name:_____

Address:_____

City:_____ State:_____ Zip:_____

DBE Firm: DBE Firm:_____

Address:_____

City:_____ State:_____ Zip:_____

DBE Contact Person: Name:_____ Phone: (___)_____

DBE Certifying Agency: _____ Expiration Date:_____

Each DBE Firm shall submit evidence (such as a photocopy) of their certification status.

Classification: ☐ Prime Contractor ☐ Subcontractor ☐ Joint Venture ☐ Manufacturer ☐ Supplier

Work item(s) to be performed by DBE	Description of Work Item	Quantity	Total

The bidder/offeror is committed to utilizing the above-named DBE firm for the work described above. The estimated participation is as follows:

DBE contract amount:_____ Percent of total contract:_____%

AFFIRMATION:

The above-named DBE firm affirms that it will perform that portion of the contract for the estimated dollar value as stated herein above.

By:_____
(Signature) (Title)

*In the event the bidder/offeror does not receive award of the prime contract, any and all representations in this Letter of Intent and Affirmation shall be null and void.

CITY OF DEFUNIAK SPPRINGS, FLORIDA

PROPOSAL BOND

(NOT TO BE FILLED OUT IF A CERTIFIED OR CASHIER'S CHECK IS SUBMITTED)

KNOW ALL MEN BY THESE PRESENTS: That we, the undersigned bidder _____ _____, as Principal, and _____, as a Corporation Surety authorized under the laws of the State of Florida, and authorized to write this type of bond through a resident agent of the corporation located in the State of _____, as, surety, are held and firmly bound unto the City of DeFuniak Springs, Florida in the sum of _____ _____ Dollars ($_____) for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves and our heirs, executors, administrators, successors and assigns.

The condition of the above obligation is such that if the attached proposal of _____ _____ for the improvement of airport facilities stipulated in said proposal in accordance with the Plans and Specifications provided therefore, is accepted and the Contract awarded to the above named Bidder, and the said Bidder shall within ten (10) calendar days after notice of said award enter into a Contract in writing and furnish the required Payment and Performance Bonds with surety, or sureties, to be approved by the City of DeFuniak Springs this obligation shall be void. Otherwise, the same shall be in full force and virtue of law, and the full amount of this Proposal Bond will be paid to the City of DeFuniak Springs as stipulated for liquidated damages.

Signed this _____ day of _____, 20___.

(PRINCIPAL MUST INDICATE WHETHER CORPORATION, PARTNERSHIP, COMPANY OR INDIVIDUAL)

_____

_____
Principal (Seal)

THIS PERSON SIGNING SHALL IN HIS OWN HANDWRITING SIGN THE PRINCIPAL'S NAME, AND HIS TITLE. BY WHERE THE PERSON SIGNING FOR A CORPORATION IS OTHER THAN THE PRESIDENT OR VICE PRESIDENT, HE MUST, BY AFFIDAVIT AS CONTAINED HEREIN, SHOW HIS AUTHORITY TO BIND THE CORPORATION.

By:_____

_____
(Name and Title)

_____
Surety (Seal)

By:_____

_____
(Name and Title)

BUY AMERICAN PREFERENCE STATEMENT

BUY AMERICAN PREFERENCE

The contractor agrees to comply with 49 USC § 50101, which provides that Federal funds may not be obligated unless all steel and manufactured goods used in AIP funded projects are produced in the United States, unless the FAA has issued a waiver for the product; the product is listed as an Excepted Article, Material Or Supply in Federal Acquisition Regulation subpart 25.108; or is included in the FAA Nationwide Buy American Waivers Issued list.

A bidder or offeror must complete and submit the Buy America certification included herein with their bid or offer. The Owner will reject as nonresponsive any bid or offer that does not include a completed Certificate of Buy American Compliance.

CERTIFICATE OF BUY AMERICAN COMPLIANCE FOR TOTAL FACILITY

As a matter of bid responsiveness, the bidder or offeror must complete, sign, date, and submit this certification statement with their proposal. The bidder or offeror must indicate how they intend to comply with 49 USC § 50101 by selecting one of the following certification statements. These statements are mutually exclusive. Bidder must select one or the other (i.e. not both) by inserting a checkmark (✓) or the letter "X".

☐ Bidder or offeror hereby certifies that it will comply with 49 USC. 50101 by:

a) Only installing steel and manufactured products produced in the United States; or
b) Installing manufactured products for which the FAA has issued a waiver as indicated by inclusion on the current FAA Nationwide Buy American Waivers Issued listing; or
c) Installing products listed as an Excepted Article, Material or Supply in Federal Acquisition Regulation Subpart 25.108.

By selecting this certification statement, the bidder or offeror agrees:

1. To provide to the Owner evidence that documents the source and origin of the steel and manufactured product.
2. To faithfully comply with providing US domestic products.
3. To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

☐ The bidder or offeror hereby certifies it cannot comply with the 100% Buy American Preferences of 49 USC § 50101(a) but may qualify for either a Type 3 or Type 4 waiver under 49 USC § 50101(b). By selecting this certification statement, the apparent bidder or offeror with the apparent low bid agrees:

1. To the submit to the Owner within 15 calendar days of the bid opening, a formal waiver request and required documentation that support the type of waiver being requested.
2. That failure to submit the required documentation within the specified timeframe is cause for a non-responsive determination that may result in rejection of the proposal.
3. To faithfully comply with providing US domestic products at or above the approved US domestic content percentage as approved by the FAA.

4. To furnish US domestic product for any waiver request that the FAA rejects.
5. To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

Required Documentation

Type 3 Waiver - The cost of components and subcomponents produced in the United States is more that 60% of the cost of all components and subcomponents of the "facility". The required documentation for a type 3 waiver is:

a) Listing of all manufactured products that are not comprised of 100% US domestic content (Excludes products listed on the FAA Nationwide Buy American Waivers Issued listing and products excluded by Federal Acquisition Regulation Subpart 25.108; products of unknown origin must be considered as non-domestic products in their entirety)
b) Cost of non-domestic components and subcomponents, excluding labor costs associated with final assembly and installation at project location.
c) Percentage of non-domestic component and subcomponent cost as compared to total "facility" component and subcomponent costs, excluding labor costs associated with final assembly and installation at project location.

Type 4 Waiver – Total cost of project using US domestic source product exceeds the total project cost using non-domestic product by 25%. The required documentation for a type 4 of waiver is:

a) Detailed cost information for total project using US domestic product
b) Detailed cost information for total project using non-domestic product

False Statements: Per 49 USC § 47126, this certification concerns a matter within the jurisdiction of the Federal Aviation Administration and the making of a false, fictitious or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code.

Date	Signature
Company Name	Title

CERTIFICATE OF BUY AMERICAN COMPLIANCE FOR MANUFACTURED PRODUCTS

As a matter of bid responsiveness, the bidder or offeror must complete, sign, date, and submit this certification statement with their proposal. The bidder or offeror must indicate how they intend to comply with 49 USC § 50101 by selecting one on the following certification statements. These statements are mutually exclusive. Bidder must select one or the other (not both) by inserting a checkmark (✓) or the letter "X".

☐ Bidder or offeror hereby certifies that it will comply with 49 USC § 50101 by:

a) Only installing steel and manufactured products produced in the United States, or;
b) Installing manufactured products for which the FAA has issued a waiver as indicated by inclusion on the current FAA Nationwide Buy American Waivers Issued listing, or;
c) Installing products listed as an Excepted Article, Material or Supply in Federal Acquisition Regulation Subpart 25.108.

By selecting this certification statement, the bidder or offeror agrees:

1. To provide to the Owner evidence that documents the source and origin of the steel and manufactured product.
2. To faithfully comply with providing US domestic product
3. To furnish US domestic product for any waiver request that the FAA rejects
4. To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

☐ The bidder or offeror hereby certifies it cannot comply with the 100% Buy American Preferences of 49 USC § 50101(a) but may qualify for either a Type 3 or Type 4 waiver under 49 USC § 50101(b). By selecting this certification statement, the apparent bidder or offeror with the apparent low bid agrees:

1. To the submit to the Owner within 15 calendar days of the bid opening, a formal waiver request and required documentation that support the type of waiver being requested.
2. That failure to submit the required documentation within the specified timeframe is cause for a non-responsive determination may result in rejection of the proposal.
3. To faithfully comply with providing US domestic products at or above the approved US domestic content percentage as approved by the FAA.
4. To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

REQUIRED DOCUMENTATION

Type 3 Waiver - The cost of the item components and subcomponents produced in the United States is more that 60% of the cost of all components and subcomponents of the "item". The required documentation for a type 3 waiver is:

a) Listing of all product components and subcomponents that are not comprised of 100% US domestic content (Excludes products listed on the FAA Nationwide Buy American Waivers Issued listing and products excluded by Federal Acquisition Regulation Subpart 25.108; products of unknown origin must be considered as non-domestic products in their entirety).

b) Cost of non-domestic components and subcomponents, excluding labor costs associated with final assembly at place of manufacture.
c) Percentage of non-domestic component and subcomponent cost as compared to total "item" component and subcomponent costs, excluding labor costs associated with final assembly at place of manufacture.

Type 4 Waiver – Total cost of project using US domestic source product exceeds the total project cost using non-domestic product by 25%. The required documentation for a type 4 of waiver is:

a) Detailed cost information for total project using US domestic product
b) Detailed cost information for total project using non-domestic product

False Statements: Per 49 USC § 47126, this certification concerns a matter within the jurisdiction of the Federal Aviation Administration and the making of a false, fictitious or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code.

Date	Signature
Company Name	Title

CERTIFICATION OF NON-SEGREGATED FACILITIES FORM

The Contractor certifies that no segregated facilities are maintained and will not be maintained during the execution of this contract at any of its establishments.

The Contractor further certifies that none of its employees are permitted to perform their services at any location under the Contractor's control during the life of this contract where segregated facilities are maintained.

The Contractor certifies further that it will not maintain or provide for its employees any segregated facilities at any of its establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained.

As used in this certification, the term "segregated facilities" means any waiting rooms, work area, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color or national origin, because of habit, local custom, or otherwise.

The Contractor agrees that (except where it has obtained identical certification from proposed subcontractors for specific time periods) it will obtain identical certifications from proposed subcontractors prior to the award of subcontract exceeding $10,000 and that it will retain such certifications in its files.

_____

Contractor

_____

Signature of Authorized Representative Date

_____

Printed or Typed Name and Title of Authorized Representative

END OF SECTION

FLORIDA STATUTES ON PUBLIC ENTITY CRIMES AFFIDAVIT

Project Name:_____

Bid No.:_____

The Affiant identified below attests to the following:

1. I understand that a "public entity crime" as defined in Section 287.133(1)(g), Florida Statutes, means a violation of any State or Federal law by a person with respect to and directly related to the transaction of business with any public entity or with an agency or political subdivision of any other state or with the United States, including, but not limited to, any bid or contract for goods or services to be provided to any public entity or an agency or political subdivision of any other state or of the United States and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentation.

2. I understand that "convicted" or "conviction" as defined in Paragraph 287.133(1)(b), Florida Statutes, means a finding of guilt or a conviction of a public entity crimes, with or without an adjudication of guilt, in any Federal or state trial court of record relating to charges brought by indictment or information after July 1, 1989, as a result of a jury verdict, non-jury trial, or entry of a plea of guilty or nolo contendere.

3. I understand that an "affiliate" as defined in Section 287.133(1)(a), Florida Statutes, means: A predecessor or successor of a person convicted of a public entity crime: or an entity under the control of any natural person who is active in the management of the entity and how has been convicted of a public entity crime. The term "affiliate" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in the management of an affiliate. The ownership by one (1) person of shares constituting a controlling interest in another person, or a pooling of equipment or income among persons when not for fair market value under an arm's length agreement, shall be a prima facie case that one person controls another person. A person who knowingly enters into a joint venture with a person who has been convicted of a public entity crime in Florida during the preceding thirty-six (36) months shall be considered an affiliate.

4. I understand that a "person" as defined in Section 287.133(1)(e), Florida Statutes, means any natural person or entity organized under the laws of any state or of the United States with the legal power to enter into a binding contract and which bids or applies to bid on contracts for the provision of goods or services let by a public entity, or which otherwise transacts or applies to transact business with a public entity. The term "person" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in management of an entity.

5. Based on information and belief, the statement which I have marked below is true in relation to the entity submitting this sworn statement. (Note: indicate which of the below statements apply)

   _____Neither the entity submitting this sworn statement, nor any officers, directors, executives, partners, shareholders, employees, members, or agents who are active in management of the entity, nor the affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989.

_____The entity submitting this sworn statement, or one or more of the officers, directors, executives, partners, shareholders, employees, members or agent who are active in management of the entity, or an affiliate of the entity, has been charged with and convicted of a public entity crime subsequent to July 1, 1989.

_____The entity submitting this sworn statement, or one or more of the officers, directors, executives, partners, shareholders, employees, members or agents who are active in management of the entity, or an affiliate of the entity, has been charged with and convicted of a public entity crime subsequent to July 1, 1989. However, there has been a subsequent proceeding before an Administrative Law Jury of the State of Florida, Division of Administrative Hearings and the Final Order entered by the Administrative Law Jury determined that it was not in the public interest to place the entity submitting this sworn statement on the convicted vendor list. (You must attach a copy of the final order.)

I understand that the submission of this form to the Owner and is for the Owner only and, that this form is valid through December 31, of the calendar year in which it is filed. I also understand that i am required to inform the Owner prior to entering into a contract in excess of the threshold amount provided in section 287.017, Florida Statues, for category two of any change in the information contained in this form.

_____

Bidder FEIN No.

_____

Signature of Authorized Representative (Affiant) Date

_____

Printed or Typed Name and Title of Authorized Representative (Affiant)

COUNTY OF _____, STATE OF FLORIDA

On this _____ day of _____, 20 _____, before me, the undersigned Notary Public of the State of Florida, personally appeared_____ whose name(s) is/are subscribed to the within instrument, and he/she/they acknowledge that he/she/they executed it. WITNESS my hand and official seal. He/She is personally known to me or has produced_____, as identification.

_____

(Notary Public in and for the County and State Aforementioned)

SEAL My commission expires: _____

END OF SECTION

GENERAL CIVIL RIGHTS PROVISIONS

The contractor agrees to comply with pertinent statutes, Executive Orders and such rules as are promulgated to ensure that no person shall, on the grounds of race, creed, color, national origin, sex, age, or disability be excluded from participating in any activity conducted with or benefiting from Federal assistance.

This provision binds the contractor and subtier contractors from the bid solicitation period through the completion of the contract. This provision is in addition to that required of Title VI of the Civil Rights Act of 1964.

Title VI Solicitation Notice

The **City of DeFuniak Springs**, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

Compliance with Nondiscrimination Requirements

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Title VI List of Pertinent Nondiscrimination Acts and Authorities, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.
2. **Non-discrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Nondiscrimination Acts and Authorities, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21.
3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Nondiscrimination Acts and Authorities on the grounds of race, color, or national origin.
4. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the sponsor or the Federal Aviation Administration to be pertinent to ascertain compliance with such Nondiscrimination Acts and Authorities and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the sponsor or the Federal Aviation Administration, as appropriate, and will set forth what efforts it has made to obtain the information.

5. **Sanctions for Noncompliance:** In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the sponsor will impose such contract sanctions as it or the Federal Aviation Administration may determine to be appropriate, including, but not limited to:

   a. Withholding payments to the contractor under the contract until the contractor complies; and/or

   b. Cancelling, terminating, or suspending a contract, in whole or in part.

6. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the sponsor or the Federal Aviation Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the sponsor to enter into any litigation to protect the interests of the sponsor. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

CLAUSES FOR CONSTRUCTION/USE/ACCESS TO REAL PROPERTY ACQUIRED UNDER THE ACTIVITY, FACILITY OR PROGRAM

The following clauses will be included in deeds, licenses, permits, or similar instruments/agreements entered into by the City of DeFuniak Springs pursuant to the provisions of the Airport Improvement Program grant assurances.

A. The (grantee, licensee, permittee, etc., as appropriate) for himself/herself, his/her heirs, personal representatives, successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree (in the case of deeds and leases add, "as a covenant running with the land") that (1) no person on the ground of race, color, or national origin, will be excluded from participation in, denied the benefits of, or be otherwise subjected to discrimination in the use of said facilities, (2) that in the construction of any improvements on, over, or under such land, and the furnishing of services thereon, no person on the ground of race, color, or national origin, will be excluded from participation in, denied the benefits of, or otherwise be subjected to discrimination, (3) that the (grantee, licensee, lessee, permittee, etc.) will use the premises in compliance with all other requirements imposed by or pursuant to the List of discrimination Acts And Authorities.

B. With respect to (licenses, leases, permits, etc.), in the event of breach of any of the above nondiscrimination covenants, the City of DeFuniak Springs will have the right to terminate the (license, permit, etc., as appropriate) and to enter or re-enter and repossess said land and the facilities thereon, and hold the same as if said (license, permit, etc., as appropriate) had never been made or issued.*

C. With respect to deeds, in the event of breach of any of the above nondiscrimination covenants, the DeFuniak Springs Airport will there upon revert to and vest in and become the absolute property of the City of DeFuniak Springs and its assigns.

Title VI List of Pertinent Nondiscrimination Acts and Authorities

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq*., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin);
- 49 CFR part 21 (Non-discrimination in Federally-Assisted Programs of The Department of Transportation—Effectuation of Title VI of The Civil Rights Act of 1964);
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 *et seq*.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 *et seq*.), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act of 1990, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131 – 12189) as implemented by Department of Transportation regulations at 49 CFR parts 37 and 38;
- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures non-discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq).

CLEAN AIR AND WATER POLLUTION CONTROL

Contractor agrees to comply with all applicable standards, orders, and regulations issued pursuant to the Clean Air Act (42 U.S.C. § 740-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. § 1251-1387). The Contractor agrees to report any violation to the Owner immediately upon discovery. The Owner assumes responsibility for notifying the Environmental Protection Agency (EPA) and the Federal Aviation Administration.

Contractor must include this requirement in all subcontracts that exceed $150,000.

CERTIFICATION REGARDING LOBBYING

The bidder or offeror certifies by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the Bidder or Offeror, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

PROCUREMENT OF RECOVERED MATERIALS

Contractor and subcontractor agree to comply with Section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, and the regulatory provisions of 40 CFR Part 247. In the performance of this contract and to the extent practicable, the Contractor and subcontractors are to use of products containing the highest percentage of recovered materials for items designated by the Environmental Protection Agency (EPA) under 40 CFR Part 247 whenever:

a) The contract requires procurement of $10,000 or more of a designated item during the fiscal year; or,

b) The contractor has procured $10,000 or more of a designated item using Federal funding during the previous fiscal year.

The list of EPA-designated items is available at:
https://www.epa.gov/smm/comprehensive-procurement-guidelines-construction-products

Section 6002(c) establishes exceptions to the preference for recovery of EPA-designated products if the contractor can demonstrate the item is:

a) Not reasonably available within a timeframe providing for compliance with the contract performance schedule;

b) Fails to meet reasonable contract performance requirements; or

c) Is only available at an unreasonable price.

INSURANCE REQUIREMENTS

1. The amounts and types of insurance coverage shall conform to the following minimum requirements with the use of Insurance Services Office (ISO) forms and endorsements of their equivalents.

2. The insurance required by this Agreement shall be written for not less than the limits specified herein or required by law, whichever is greater.

3. Coverages shall be maintained without interruption from the date of commencement of the work until the date of completion and acceptance of the project by the Owner or as specified in this Agreement, whichever is longer.

4. Certificates of insurance (3 copies) acceptable to the Owner shall be filed with Owner within ten (10) calendar days after Notice of Awards is received by Contractor/Consultant/Professional. Such certificates shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least thirty (30) days prior written notice has been given to the owner.

5. All insurance coverages of the Contractor/Consultant/Professional shall be primary to any insurance or self-insurance program carried by the Owner applicable to this Project.

6. The acceptance by Owner of a Certificate of Insurance does not constitute approval or agreement by the Owner that the insurance requirements have been satisfied or that the insurance policy shown on the Certificate of Insurance is in the compliance with the requirements of this Agreement.

7. Contractor/Consultant/Professional shall require each of its subcontractors to procure and maintain, until the completion of the subcontractor's work, insurance of the types and to the limits specified in this Section unless such insurance requirements for the subcontractor are expressly waived in writing by the Owner.

8. Should at any time the Contractor/Consultant/Professional not maintain the insurance coverages required herein, the Owner may terminate the Agreement or at its sole discretion shall be authorized to purchase such coverages and charge the Contractor for such coverages purchased. The Owner shall be under no obligation to purchase such insurance, nor shall it be responsible for the coverages purchased or the insurance company or companies used. The decision of the Owner to purchase such insurance coverages shall in no way be construed to be a waiver o f any its rights under the Contract Documents.

9. If the initial, or any subsequently issued Certificate of Insurance expires prior to the completion of the Work or termination of the Agreement, the Contractor/Consultant/Professional shall furnish to the County, in triplicate, renewal or replacement of Certificate(s) of Insurance not later than thirty (30) calendar days prior to the date of their expiration. Failure of the Contractor to provide the County with such renewal certificate(s) shall be considered justification for the County to terminate the Agreement.

10. Owner shall be included as an additional insured on all of Contractor's policies of general liability insurance.

11. Contractor shall comply with each of the following insurance requirements and obligations:

(a) Contractor shall obtain comprehensive general liability insurance, including, without limitation, coverage against claims for bodily injury, death, liability, and property damage by reason of, caused by, or resulting from the Work performed by, or any other acts or omissions of, Contractor, any of Contractor's personnel, employees, agents, suppliers, subcontractors, licensees, invitees or trespassers, and anyone claiming by or through the Contractor, and insure Contractor's indemnification obligations to OWNER, with a combined single limit of not less than One Million and 00/100 Dollars ($1,000,000.00) as the result of any one occurrence. Contractor's comprehensive general liability insurance shall also include premises and operation, contractors, products and completed operations and contractual liability.

(b) Contractor shall obtain worker's compensation insurance covering all employees meeting statutory limits in compliance with the applicable state and federal laws. The coverage must include employees' liability with the minimum limit of One Hundred Thousand and 00/100 Dollars ($100,000.00) for each accident. If exempt, Contractor shall obtain and submit to Owner a "Certificate of Exemption from Florida Workers' Compensation Law" in lieu of such workers' compensation insurance coverage.

(c) Contractor shall obtain automobile liability insurance for all automobiles owned, used or hired by Contractor, any of the Contractor's agents, employees, contractors, subcontractors, licensees, invitees or trespassers, and anyone claiming by or through the Contractor, with a combined single limit of not less than One Million and 00/100 Dollars ($1,000,000.00) as the result of any one occurrence.

(d) All of the insurance required under this section shall be obtained by Contractor prior to the commencement of the Work and shall thereafter, until the termination of this Agreement, be continually maintained by Contractor at its sole cost and expense.

(e) All insurance coverage of Contractor shall be in addition to, and shall in no way be construed or interpreted to be a limitation of, Contractor's indemnification obligations to Owner. It is expressly agreed that Contractor's policies of insurance required under this section shall be primary over any insurance which Owner may maintain or carry, and that Contractor shall obtain from its insurers an endorsement waiving any other insurance clauses which may be in conflict with this provision, and evidence of such waiver shall be indicated on all insurance policies or certificates of insurance furnished to Owner. Contractor shall be responsible and liable for insuring that all of Contractor's personnel, employees, agents, suppliers, subcontractors, licensees or invitees who perform any of the Work carry and comply the same insurance coverages and requirements required of Contractor under this section.

(f) Umbrella Liability may be maintained as part of the liability insurance of the Contractor/Consultant /Professional and, if so, such policy shall be excess of the Employers' Liability, Commercial General Liability and Automobile Liability coverages required herein and shall include all coverages on a "following form" basis. The policy shall contain wording to the effect that, in the event of the exhaustion of any underlying limit due to the payment of claims, the Umbrella policy will "drop down' to apply as primary insurance. The General Aggregate limit, if applicable, shall apply separately to this project and the policy shall be so endorsed.

END OF INSURANCE REQUIREMENTS

CONTRACT DOCUMENTS

BID DOCUMENTS

DFS TERMINAL, HANGAR, AND APRON EXPANSION
DEFUNIAK SPRINGS AIRPORT

CONTRACT

THIS CONTRACT made and entered into this _____ day of _____, 2022, by and between the **City of DeFuniak Springs, Florida** (the "Owner") and _____ (the "Contractor") concerns the **DFS Terminal, Hangar, and Apron Expansion** project.

WITNESSETH:

WHEREAS, the Owner has a project entitled **DFS Terminal, Hangar, and Apron Expansion** project and Contractor is qualified to construct said project (the "Project"); and

WHEREAS, the Contractor has submitted the lowest responsible and responsive bid for the Project at the DeFuniak Springs Airport and the Owner has awarded the Project to the Contractor; and

NOW, THEREFORE, in consideration of the sum of **$** _____ **Dollars and /100 Cents,** the mutual promises and covenants contained herein, as well as other good and valuable consideration not specifically mentioned, the parties agree as follows:

1. The Contractor, for and in consideration of the payments hereinafter specified and agreed to be made by the Owner, hereby covenants and agrees to furnish and deliver all materials required, to do and perform all the work and labor, in a satisfactory and workmanlike manner, required to complete the Project within the time specified in the project manual, in strict and entire conformity with the Plans (labeled construction), Project Manual Specifications with appendices labeled construction documents, Construction Safety Phasing Plan (CSPP) and other Contract documents, on file at the DeFuniak Springs Airport, 71 US Highway 90 West, DeFuniak Springs, Florida 32433, which are duly approved by the Owner and which said Plans, Project Manual Specifications and other Contract documents are hereby made part of this Contract as fully and with the same effects as if the same had been set forth at length in the body of this Contract.

2. The Contractor agrees to make payment of all proper charges for labor and materials required in the aforementioned work, and to defend, indemnify and save harmless the City of DeFuniak Springs, Florida and all its officers and agents against and from all suits and costs of every kind and description, and from all damages to which the said Owner or any of their officers, agents or servants may be put, by reason of injury or death to persons or injury to property of other resulting from the performance of said work, or through the negligence of the Contractor, or through any improper or defective machinery, implements or appliances used by the Contractor in the aforesaid work, or through any act of omission on the part of the Contractor, or his or her agent or agents, employees or servants.

3. The Owner hereby agrees to pay to the Contractor for the said work, when fully completed, the total sum of **$** _____ (the said sum being the total of the Contractor's bid, a copy of which is attached hereto and made a part hereof for all purposes), subject to such additions and deductions as may be provided for in the Contract Documents. In the event the bid contains multiple pay items, it is understood that the amount to be paid shall be the total based on the unit price, together with lump sum prices, contained in said bid, for the work actually completed.

4. Payments on accounts will be made as provided for in the Contract Documents.

5. The Contractor shall submit bills for fees or other compensation for services or expenses in detail sufficient for a proper pre-audit and post audit thereof.

6. The Contractor shall submit bills for any travel expenses in accordance with §112.061, Florida Statutes, or the travel policy of the Owner, as applicable.

7. The Owner may unilaterally cancel this Contract and the goods and services thereunder in the event that the Contractor fails and refuses to allow public access to all documents, papers, letters, or other material subject to the provisions of Chapter 119, Florida Statutes, made or received by the Contractor in conjunction with this Contract.

8. Any unit of provision of goods and services must be approved in writing by the Owner or its agent prior to payment.

9. The Contract documents provide the criteria and the final date for completion of the Project.

10. This Contract has been executed by the parties prior to the rendering of any goods or services by the Contractor.

11. The Contractor shall provide a payment and performance bond (the "Bond") to the Owner meeting the requirements of §255.05, Florida Statutes, in the sum of $_____ and shall cause the Bond to be recorded with the Notice of Commencement in the Public Records of the City of DeFuniak Springs, Florida.

12. This Contract shall be subordinate to any rule, regulation, order or law of the United States of America, the State of Florida or City of DeFuniak Springs, Florida.

13. The Owner will use its best efforts to obtain the approval of the State of Florida Department of Transportation and the FAA to this contract. If the Owner determines that the same requires modifications in order to qualify for funding for the Project, the Contractor shall consent or the Owner shall have the right to terminate the Contract.

14. The Contractor and its employees shall promptly observe and comply with then applicable provisions of all Federal, State and local laws, rules and regulations which govern or apply to the goods and services rendered by Contractor hereunder, or to the wages paid by Contractor to its employees. Contractor shall require all of its subcontractors to comply with the provisions of this paragraph.

    Contractor shall procure and keep in force during the term of this contract all necessary licenses, registrations, certificates, permits and other authorizations as are required by law in order for Contractor to render its services hereunder. Contractor shall require all of its subcontractors to comply with the provisions of this paragraph.

15. All remedies provided in this Contract shall be deemed cumulative and additional and not in lieu of or exclusive of each other or of any other remedy available to any party at law or in equity. In the event one party shall prevail in any action (including appellate proceedings), at law or in equity arising hereunder, the losing party will pay all costs, expense, reasonable attorneys' fees and all other actual and reasonable expenses incurred in the defense and/or prosecution of any legal or arbitration proceedings, including, but not limited to, those for paralegal, investigative and legal

support services and actual fees charged by expert witnesses for testimony and analysis, incurred by the prevailing party referable thereto.

16. Contractor represents and warrants unto Owner that no officer, employee or agent of Owner has any interest, either directly or indirectly, in the business of Contractor to be conducted hereunder. Contractor further represents and warrants to Owner that it has not employed or retained any company or person, other than a bona fide employee working solely for Contractor, to solicit or secure this Contract, that it has not paid or agreed to pay any person, company, corporation, individual or firm, other than a bona fide employee working solely for Contractor, any fee, commission, percentage, gift, or any other consideration contingent upon or resulting from the award or making of this Contract, and that it has not agreed, as an express or implied condition for obtaining this Contract, to employ or retain the services of any firm or person in connection with carrying out this Contract. Contractor assures that it will insert the above provision in each of its subcontractor agreements relating to the services to be performed hereunder.

17. Contractor for itself, its successors in interest and assigns, as a part of the consideration hereof, does hereby covenant and agree that (1) in the furnishing of services to Owner hereunder, no person on the grounds of race, color or national origin shall be excluded from participation in, denied the benefits of, or otherwise be subjected to discrimination, and (2) Contractor shall comply with all other requirements imposed by or pursuant to Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Nondiscrimination in Federally-assisted programs of the Department of Transportation – effectuation of Title VII of the Civil Rights Act of 1964, as said Regulations may be amended. Should Contractor authorize another person, with Owner's prior written consent, to provide services to Owner hereunder, Contractor shall obtain from such person a written agreement pursuant to which such person shall, with respect to the services which he or she is authorized to provide, undertake for such person the obligations contained in this section. Contractor shall furnish an original agreement to Owner.

    Contractor will provide all information and reports required by said Regulations, or by directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by Owner, the Federal Aviation Administration, the Comptroller General of the United States or any of their dully authorized representatives and the State of Florida Department of Transportation to be pertinent to ascertain whether there has been compliance with said Regulations and directives. Where any information required of Contractor is in the exclusive possession of another who fails or refused to furnish this information, Contractor shall so certify to the Owner, Federal Aviation Administration the Comptroller General of the United States or any of their dully authorized representatives and the State of Florida Department of Transportation, as appropriate, and shall set forth what efforts it has made to obtain the information. Contractor shall remain obligated under this paragraph until the expiration of three (3) years after the termination of the Contract. In the event of breach of any of the above nondiscrimination covenants, Owner shall have the right to impose such contract sanctions as it or Federal Aviation Administration the Comptroller General of the United States or any of their dully authorized representatives and the State of Florida Department of Transportation or other applicable government entity may determine to be appropriate, including withholding payments to Contractor under this Contract or canceling, terminating, or suspending this Contract in whole or in part. The rights granted to Owner by the

foregoing sentence shall not be effective until the procedures of Title 49, Code of Federal Regulations, Part 21 are followed and completed, including exercise or expiration of appeal rights.

Further, Contractor assures that it will undertake an affirmative action program as required by 14 CFR Part 152, Subpart E, to ensure that no person shall on the grounds of race, religion, creed, color, national origin or sex be excluded from participating in any employment activities covered in 14 CFR Part 152, Subpart E. Such activities shall include, but not be limited to, the following: Employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Contractor assures that no person shall be excluded on these grounds from participating in or receiving the services of any program or activity covered by this subpart. Contractor assures that it shall not discriminate on the grounds of race, color, religion, sex or national origin in the selection or retention of subcontractors. Contractor assures that it will require that its covered subcontractors provide assurances to Contractor that they similarly require assurances from their subcontractors, as required by CFR Part 152, Subpart E, to the same effect.

Owner may, from time to time, adopt additional or amended and nondiscrimination provisions concerning the furnishing of services to the Airport, and Contractor agrees that it will adopt any such requirements as a part of this Contract.

18. Policy. It is the policy of the Owner and the United States or State of Florida Department of Transportation that disadvantaged business enterprises, as defined in the Owner's Disadvantaged Business Enterprises ("DBE") Participation Policy for services as defined in 49 CFR Part 26 shall have equal opportunity to participate in the performance of services contracts awarded by the Owner, including, but not limited to, contracts financed in whole or in part with federal or State funds under this Contract. Consequently, the requirements of the Owner's DBE Participation Policy apply to this Contract.

    Contract Assurance. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate.

    Prompt Payment. The prime contractor agrees to pay each subcontractor under this prime contract for satisfactory performance of its contract no later than fourteen (14) days from the receipt of each payment the prime contractor receives from the City of DeFuniak Springs. The prime contractor further agrees to return retainage payments to each subcontractor within fourteen (14) days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of the City of DeFuniak Springs. The City of DeFuniak Springs shall have the right to terminate the services of any obligor who fails to make prompt payment to any obligee. This clause applies to both DBE and non-DBE subcontractors.

    DBE Obligation. The Contractor agrees to ensure that DBE/MWBE firms shall have the maximum opportunity to participate in the performance of contracts for subcontractor services, including,

but not limited to, those projects financed in whole or in part with federal or state funds provided under this Contract. In this regard, the Contractor and all subcontractors shall take all necessary and reasonable steps in accordance with the Owner's DBE/MWBE Participation Policies to ensure that DBE/MWBE firms have the maximum opportunity to compete for and perform contracts. The Contractor and any subcontractors shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of Owner contracts.

19. Government Agencies which are not Parties. Neither the Federal Aviation Administration nor the Florida Department of Transportation has nor will they incur any obligations to Contractor under this Contract.

20. Headings. The headings of the sections of this Contract are for the purpose of convenience only and shall not be deemed to expand or limit the provisions contained in such sections.

21. Entire Agreement. This Contract, including all Contract documents, constitute the entire agreement between the parties and shall supersede and replace all prior agreements or understandings, written or oral, relating to the matters set forth herein.

22. Amendment. This Contract shall not be amended or modified other than in writing signed by the parties hereto. Notwithstanding the foregoing, any Amendments that are not being paid for, in whole or in part, with funds granted by the United States or State of Florida Department of Transportation need not be approved by them.

23. Validity. The validity, interpretation, construction and effect of this Contract shall be in accordance with and be governed by the laws of the State of Florida. In the event any provision hereof shall be finally determined to be unenforceable, or invalid, such unenforceability or invalidity shall not affect the remaining provisions of this Contract which shall remain in full force and effect.

24. Public Entity Crimes. Pursuant to Section 287.133(2)(a), Florida Statutes, a Contractor who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid on contract to provide services for a public entity, may not be awarded a Contract and may not transact business with a public entity for services, the value of which exceeds $15,000.00 for a period of 36 months from the date of being placed on the convicted vendor list. Contractor hereby represents that it does not fall within the class of persons identified in the previous sentence such that Contractor would be precluded from entering this Contract.

25. All Construction Contracts over $2,000.

    Davis-Bacon Requirements.

    1. Minimum Wages

        (i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalent thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part

hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided*, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under (1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can easily be seen by the workers.

(ii) (A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii) (B) or (C) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided*, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding.
The Federal Aviation Administration or the sponsor shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of work, all or part of the wages required by the contract, the Federal Aviation Administration may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and Basic Records.
(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter

for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual costs incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii) (A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Federal Aviation Administration if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the Federal Aviation Administration. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (*e.g.* the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at *http://www.dol.gov/esa/whd/forms/wh347instr.htm* or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the Federal Aviation Administration if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit them to the applicant, sponsor, or owner, as the case may be, for transmission to the Federal Aviation Administration, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, sponsor, or owner).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under 29 CFR § 5.5(a)(3)(ii), the appropriate information is being maintained under 29 CFR § 5.5 (a)(3)(i) and that such information is correct and complete;

(2) That each laborer and mechanic (including each helper, apprentice and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (3)(i) of this section available for inspection, copying or transcription by authorized representatives of the sponsor, the Federal Aviation Administration or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and Trainees.
(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by

the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate that is not registered and participating in a training plan approved by the

Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal Employment Opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act Requirements.
The contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract.

6. Subcontracts.
The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR Part 5.5(a)(1) through (10) and such other clauses as the Federal Aviation Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR Part 5.5.

7. Contract Termination: Debarment.
A breach of the contract clauses in paragraph 1 through 10 of this section may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with all rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes Concerning Labor Standards.
Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6 and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of Eligibility.
(i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

26. Copeland "Anti-Kickback" Act. Contractor must comply with the requirements of the Copeland "Anti-Kickback" Act (18 U.S.C. 874 and 40 U.S.C. 3145), as supplemented by Department of Labor regulation 29 CFR part 3. Contractor and subcontractors are prohibited from inducing, by any means, any person employed on the project to give up any part of the compensation to which the employee is entitled. The Contractor and each Subcontractor must submit to the Owner, a weekly statement on the wages paid to each employee performing on covered work during the prior week. Owner must report any violations of the Act to the Federal Aviation Administration.

27. Contract Workhours and Safety Standards Act Requirements.
This Provision applies to all contracts and lower tier contracts that exceed $100,000, and employ laborers, mechanics, watchmen and guards.

1. Overtime Requirements.
No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic, including watchmen and guards, in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; Liability for Unpaid Wages; Liquidated Damages.
In the event of any violation of the clause set forth in paragraph (1) of this clause, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this clause, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this clause.

3. Withholding for Unpaid Wages and Liquidated Damages.
   The Federal Aviation Administration (FAA) or the Owner shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph 2 of this clause.

4. Subcontractors.
   The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs (1) through (4) and also a clause requiring the subcontractor to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this clause.

28. Breach of Contract Terms – Sanctions (All Contracts).
    Any violation or breach of the terms of this Contract of the part of the Contractor or subcontractors may result in the suspension or termination of this Contract or such other action that may be necessary to enforce the rights of the parties of this agreement.

    Owner will provide Contractor written notice that describes the nature of the breach and corrective actions the Contractor must undertake in order to avoid termination of the contract. Owner reserves the right to withhold payment to Contractor until such time the Contractor corrects the breach or the Owner elects to terminate the contract. The Owner's notice will identify a specific date by which the Contractor must correct the breach. Owner may proceed with termination of the contract if the Contractor fails to correct the breach by deadline indicated in the Owner's notice.

    The duties and obligations imposed by the contract documents and the rights and remedies available thereunder are in addition to, and not a limitation of, any duties, obligations, rights and remedies otherwise imposed or available by law.

29. Rights to Inventions (All Contracts).
    All rights to inventions and materials generated under this contract are subject to regulations issued by the FAA and the Owner of the Federal grant under which this contract is executed. Information regarding these rights is available from FAA and the Owner.

30. Trade Restriction Certification.
    By submission of an offer, the Offeror certifies that with respect to this solicitation and any resultant contract, the Offeror –

    a. is not owned or controlled by one or more citizens of a foreign country included in the list of countries that discriminate against U.S. firms as published by the Office of the United States Trade Representative (U.S.T.R.);

b. has not knowingly entered into any contract or subcontract for this project with a person that is a citizen or national of a foreign country included on the list of countries that discriminate against U.S. firms as published by the U.S.T.R; and

c. has not entered into any subcontract for any product to be used on the Federal on the project that is produced in a foreign country included on the list of countries that discriminate against U.S. firms published by the U.S.T.R.

This certification concerns a matter within the jurisdiction of an agency of the United States of America and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code, Section 1001.

The Offeror/Contractor must provide immediate written notice to the Owner if the Offeror/Contractor learns that its certification or that of a subcontractor was erroneous when submitted or has become erroneous by reason of changed circumstances. The Contractor must require subcontractors provide immediate written notice to the Contractor if at any time it learns that its certification was erroneous by reason of changed circumstances.

Unless the restrictions of this clause are waived by the Secretary of Transportation in accordance with 49 CFR 30.17, no contract shall be awarded to an Offeror or subcontractor:

a. who is owned or controlled by one or more citizens or nationals of a foreign country included on the list of countries that discriminate against U.S. firms published by the U.S.T.R. or

b. whose subcontractors are owned or controlled by one or more citizens or nationals of a foreign country on such U.S.T.R. list or

c. who incorporates in the public works project any product of a foreign country on such U.S.T.R. list;

Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by this provision. The knowledge and information of a contractor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

The Offeror agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification without modification in in all lower tier subcontracts. The contractor may rely on the certification of a prospective subcontractor that it is not a firm from a foreign country included on the list of countries that discriminate against U.S. firms as published by U.S.T.R, unless the Offeror has knowledge that the certification is erroneous.

This certification is a material representation of fact upon which reliance was placed when making an award. If it is later determined that the Contractor or subcontractor knowingly rendered an erroneous certification, the Federal Aviation Administration may direct through the Owner cancellation of the contract or subcontract for default at no cost to the Owner or the FAA.

31. Termination of Contract (All Contracts in Excess of $10,000).
    a. The Owner may terminate this contract in whole or in part at any time by providing written notice to the Contractor. Such action may be without cause and without prejudice to any other right or remedy of Owner. Upon receipt of a written notice of termination, except as explicitly directed by the Owner, the Contractor shall immediately proceed with the following obligations regardless of any delay in determining or adjusting amounts due under this clause:

        1. Contractor must immediately discontinue work as specified in the written notice.

        2. Terminate all subcontracts to the extent they relate to the work terminated under the notice.

        3. Discontinue orders for materials and services except as directed by the written notice.

        4. Deliver to the owner all fabricated and partially fabricated parts, completed and partially completed work, supplies, equipment and materials acquired prior to termination of the work and as directed in the written notice.

        5. Complete performance of the work not terminated by the notice.

        6. Take action as directed by the owner to protect and preserve property and work related to this contract that Owner will take possession.

    Owner agrees to pay Contractor for:

    a. Completed and acceptable work executed and accordance with the contract documents prior to the effective date of termination;

    b. Documented expenses sustained prior to the effective date of termination in performing work and furnishing labor, materials, or equipment as required by the contract documents in connection with uncompleted work;

    c. Reasonable and substantiated claims, cost and damages incurred in settlement of terminated contracts with subcontractors and suppliers; and

    d. Reasonable and substantiated expenses to the contractor directly attributable to Owner's termination action

    e. If the termination is due to failure to fulfill the contractor's obligations, the Owner may take over the work and prosecute the same to completion by contract or otherwise. In such case, the Contractor shall be liable to the Owner for any additional cost occasioned to the Sponsor (Owner) thereby.

    Owner will not pay Contractor for loss of anticipated profits or revenue or other economic loss arising out of or resulting from the Owner's termination action.

    The rights and remedies this clause provides are in addition to any other rights and remedies provided by law or under this contract.

Termination for Default:
Section 80-09 of FAA Advisory Circular 150/5370-10 establishes conditions, rights and remedies associated with Owner termination of this contract due default of the Contractor.

32. Suspension and Debarment Requirements for all Contracts over $25,000 (and for all Contracts for Auditing Services Regardless of the Amount).
The bidder/offeror certifies, by submission of this proposal or acceptance of this contract that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. It further agrees by submitting this proposal that it will include this clause without modification in all lower tier transaction, solicitations, proposals, contracts, and subcontracts. Where the bidder/offeror/contractor or any lower tier participant is unable to certify to this statement, it shall attach an explanation to this solicitation/proposal.

33. Veteran's Preference (All Construction Contracts).
In the employment of labor (except in executive, administrative, and supervisory positions), the contractor and all sub-tier contractors must give preference to covered veterans as defined within Title 49 United States code Section 47112. Covered Veterans include Vietnam-era, Persian Gulf, Afghanistan-Iraq war veterans, disabled veterans, and small business concerns (as defined by 15 U.S.C. 632) owned and controlled by disabled Veterans. This preference only applies when they are covered Veterans readily available and qualified to perform the work to which the employment relates.

34. Notwithstanding anything to the contrary in the Contract Documents, an extension in the Contract Time, to the extent permitted under the Contract Documents, shall be the sole remedy of the Contractor for any (i) delay in the commencement, prosecution or completion of the Work, (ii) hindrance or obstruction in the performance of the Work, (iii) loss of productivity, or (iv) other similar claims (collectively referred to as "Delay") whether or not such Delay is foreseeable, unless the Delay is caused by acts of the Owner constituting active interference with the Contractor's performance of the Work, and only to the extent such acts continue after the Contractor furnishes the Owner with notice of such interference. In no event shall the contractor be entitled to any compensation or recovery of any damage in connection with any Delay, including, without limitation, consequential damages, lost opportunity costs, impact damages or other similar remuneration. The Owner's exercise of any of its rights or remedies under the Contract Documents (including, without limitation, ordering changes in the Work, or directing suspension, rescheduling or correction of the Work), regardless of the extent or frequency of Owner's exercise of such rights or remedies, shall not be construed as active interference with the Contractor's performance of the Work.

35. Texting When Driving.
In accordance with Executive Order 13513, "Federal Leadership on Reducing Text Messaging While Driving" (10/1/2009) and DOT order 3902.10 "Text Messaging While Driving" (12/30/2009), FAA encourages recipients to Federal grant funds to adopt and enforce safety policies that decrease crashes by distracted drivers, including policies to ban text messaging while driving when performing work related to a grant or sub-grant.

The Contractor must promote policies and initiatives for employees and other work personnel that decrease crashes by distracted drivers, including policies to ban text messaging while driving.

The Contractor must include these policies in each third-party subcontract exceeding $3,500 and involve driving a motor vehicle in performance of work activities associated with this project.

36. Employment Eligibility (Using E-Verify). Agency/Vendors/Contractors.
Contractors and subcontractors performing work or providing services pursuant to this contract shall utilize the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of all new employees hired by the contractor or subcontractor during the contract term.

IN WITNESS WHEREOF, the Owner and Contractor hereto have executed this Contract on the day and date first above written in three counterparts, each deemed an original contract.

Signed, Sealed & Delivered in the

Presence of:

City of DeFuniak Springs

By:_____

Title:_____

As to Owner

Attest:

By:_____

Title:_____

As to Contractor

[Contractor Name]

By:_____

Title:_____

Attest:

By:_____

Title:_____

Contractor shall indicate whether

Corporation, **Partnership**, **Company** or **Individual**

(Circle one)

The person signing shall, in his own handwriting, sign the principal's name, his own name, and his title.

Where the person signing for a corporation is other than the President or Vice President, he must by affidavit, as contained herein, show his authority to bind the corporation.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That_____ as Principal, hereinafter called Contractor, and _____, as Surety, hereinafter called Surety, are held and firmly bound unto the City of DeFuniak Springs as Obligee, hereinafter called Owner, in the amount of **$_____ Dollars and /100 Cents** for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, and successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Contractor has, by written agreement dated _____, entered into a contract with Owner for the **DFS Terminal, Hangar, and Apron Expansion** project at DeFuniak Springs Airport, in accordance with Plans and Specifications prepared by AVCON, INC., which Contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if Contractor shall promptly and faithfully perform said Contract, then the obligation shall be null and void; otherwise, it shall remain in full force and effect.

The Surety hereby waives notice of any alteration or extension of time made by the Owner.

Whenever Contractor shall be, and declared by Owner to be, in default under the Contract, the Owner having performed Owner's obligations thereunder, the Surety may promptly remedy the default, or shall promptly:

(1) Complete the Contract in accordance with its terms and conditions, or

(2) Obtain a bid or bids for completing the Contract in accordance with its terms and conditions, upon determination by Surety of the lowest responsive bidder, or, if the Owner elects, upon determination by the Owner and the Surety jointly of the lowest responsive Bidder, arrange for a contract between such Bidder and Owner, and make available as work progresses (even though there should be a default or a succession of defaults under the Contract or Contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the Contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "balance of the Contract price," as used in this paragraph, shall mean the total amount payable by Owner to Contractor under the Contract and any amendments thereto, less the amount properly paid by Owner to Contractor.

Any suit under this Bond must be instituted before the expiration or 1 year from the date on which final payment under the Contract falls due.

No right of action shall accrue on this Bond to or for the use of any person or corporation other than the Owner named herein or the heirs, executors, administrators, or successors of the Owner.

Signed and sealed this _____ day of _____, 20___.

. _____

(Witness) (Principal) (Seal)

_____

(Name and Title)

_____

(Witness) (Surety) (Seal)

_____

(Name and Title)

SURETY BOND AFFIDAVIT

STATE OF _____

COUNTY OF _____

Before me, the undersigned authority, personally appeared _____ who, being duly sworn, deposes and says that he or she is a duly authorized (resident) (nonresident) insurance agent, properly licensed under the laws of the State of _____, to represent _____ of _____ (company name), a company authorized to make corporate surety bonds under the laws of the State of Florida.

Said _____ further certifies that as Attorney-In-Fact for the said he or she has signed the attached bond in the sum of **$** _____ **Dollars and /100 Cents**, on behalf of _____ **.** the **DFS Terminal, Hangar, and Apron Expansion** project at DeFuniak Springs Airport.

Said _____ further certifies that the premium on the said bond is _____, which will be paid in full direct to him as Attorney-In-Fact, and included in his or her regular accounts to the said _____, and that he or she will receive his or her regular commission of _____ percent as Attorney-In-Fact for the execution of said Bond and that his or her commission will not be divided with anyone except as follows, percent to _____ (company name), who is duly authorized resident insurance agent and properly licensed under the laws of the **State of Florida**.

Countersigned:

_____ _____

Florida Resident Agent Agent and Attorney-In-Fact

ACKNOWLEDGMENT FOR Attorney-In-Fact
Sworn to and subscribed before me this _____ day of _____, 20___.

_____
Notary Public, State at Large

My Commission expires: _____

LABOR AND MATERIAL PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: That _____ as Principal, hereinafter called Contractor, and _____, as Surety, hereinafter called Surety, are held and firmly bound unto the City of DeFuniak Springs as Obligee, hereinafter called Owner, for the use and benefit of claimants as here in below defined, in the amount of **$** _____

_____

Dollars and 00/100 Cents for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, Contractor has, by written agreement dated _____ entered into a Contract with Owner for the **DFS Terminal, Hangar, and Apron Expansion** project at the DeFuniak Springs Airport, in accordance with Plans and Specifications prepared by AVCON, INC., which Contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if Contractor shall promptly make payment to all claimants as herein after defined, for all labor and material used or reasonably required for use in the performance of the Contract, then this obligation shall be void; otherwise, it shall remain in full force and effect, subject, however, to the following conditions:

1. A claimant is defined as one having a direct Contract with the Contractor or with a Subcontractor of the Contractor for labor, material, or both, used or reasonably required for use in the performance of the Contract, labor and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental of equipment directly applicable to the Contract.

2. The above-named Contractor and Surety hereby jointly and severally agree with the Owner that every claimant, as herein defined, who has not been paid in full before the expiration of a period of 90 days after the date on which the last of such claimant's work or labor was done or performed, or materials were furnished by such claimant, may sue on this Bond for the use of such claimant, prosecute the suit to final judgment for such sum or sums as may be justly due claimant, and have execution thereon. The Owner shall not be liable for the payment of any costs or expenses of any such suit.

3. No suit or action shall be commenced hereunder by any claimant.

    a. Unless claimant, other than one having a direct contract with the Contractor, shall have given written notice to any two of the following: the Contractor, the Owner, or the Surety above-named, within 90 days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the Contractor, Owner, or Surety, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the aforesaid project is located, save that such service need not be made by a public officer.

b. After the expiration of 2 years following the date on which Principal ceased work on said Contract, it being understood, however, that if any limitation embodied in this Bond is prohibited by any law controlling the construction hereof, such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

c. Other than in a state court of competent jurisdiction in and for the county or other political subdivision of the state in which the Project, or any part thereof, is situated, or in the United States District Court for the district in which the Project, or any part thereof, is situated, and not elsewhere.

4. The amount of this Bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics' liens which may be filed of record against said improvement, whether or not claim for the amount of such lien be presented under and against this Bond.

Signed and sealed this _____ day of _____, 20___.

(Witness) _____ (Principal) (Seal)

_____
(Name and Title)

(Witness) _____ (Surety) (Seal)

_____
(Name and Title)

FEDERAL AVIATION ADMINISTRATION GENERAL PROVISIONS

BID DOCUMENTS

DFS TERMINAL, HANGAR, AND APRON EXPANSION
DEFUNIAK SPRINGS AIRPORT

GENERAL PROVISIONS

Section 10 Definition of Terms

Whenever the following terms are used in these specifications, in the contract, or in any documents or other instruments pertaining to construction where these specifications govern, the intent and meaning shall be interpreted as follows:

10-01 AASHTO. The American Association of State Highway and Transportation Officials, the successor association to AASHO.

10-02 Access road. The right-of-way, the roadway and all improvements constructed thereon connecting the airport to a public highway.

10-03 Advertisement. A public announcement, as required by local law, inviting bids for work to be performed and materials to be furnished.

10-04 Airport Improvement Program (AIP). A grant-in-aid program, administered by the Federal Aviation Administration (FAA).

10-05 Air operations area (AOA). For the purpose of these specifications, the term air operations area (AOA) shall mean any area of the airport used or intended to be used for the landing, takeoff, or surface maneuvering of aircraft. An air operation area shall include such paved or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiway, or apron.

10-06 Airport. Airport means an area of land or water which is used or intended to be used for the landing and takeoff of aircraft; an appurtenant area used or intended to be used for airport buildings or other airport facilities or rights of way; and airport buildings and facilities located in any of these areas, and includes a heliport.

10-07 ASTM International (ASTM). Formerly known as the American Society for Testing and Materials (ASTM).

10-08 Award. The Owner's notice to the successful bidder of the acceptance of the submitted bid.

10-09 Bidder. Any individual, partnership, firm, or corporation, acting directly or through a duly authorized representative, who submits a proposal for the work contemplated.

10-10 Building area. An area on the airport to be used, considered, or intended to be used for airport buildings or other airport facilities or rights-of-way together with all airport buildings and facilities located thereon.

10-11 Calendar day. Every day shown on the calendar.

10-12 Change order. A written order to the Contractor covering changes in the plans, specifications, or proposal quantities and establishing the basis of payment and contract time adjustment, if any, for the work affected by such changes. The work, covered by a change order, must be within the scope of the contract.

10-13 Contract. The written agreement covering the work to be performed. The awarded contract shall include, but is not limited to: Advertisement, Contract Form, Proposal, Performance Bond,

Payment Bond, any required insurance certificates, Specifications, Plans, and any addenda issued to bidders.

10-14 Contract item (pay item). A specific unit of work for which a price is provided in the contract.

10-15 Contract time. The number of calendar days or working days, stated in the proposal, allowed for completion of the contract, including authorized time extensions. If a calendar date of completion is stated in the proposal, in lieu of a number of calendar or working days, the contract shall be completed by that date.

10-16 Contractor. The individual, partnership, firm, or corporation primarily liable for the acceptable performance of the work contracted and for the payment of all legal debts pertaining to the work who acts directly or through lawful agents or employees to complete the contract work.

10-17 Contractor's laboratory. The Contractor's quality control organization in accordance with the Contractor Quality Control Program.

10-18 Construction Safety and Phasing Plan (CSPP). The overall plan for safety and phasing of a construction project developed by the airport operator or developed by the airport operator's consultant and approved by the airport operator. It is included in the invitation for bids and becomes part of the project specifications.

10-19 Drainage system. The system of pipes, ditches, and structures by which surface or subsurface waters are collected and conducted from the airport area.

10-20 Engineer. The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for engineering of the contract work and acting directly or through an authorized representative.

10-21 Equipment. All machinery, together with the necessary supplies for upkeep and maintenance, and also all tools and apparatus necessary for the proper construction and acceptable completion of the work.

10-22 Extra work. An item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, but which is found by the Engineer to be necessary to complete the work within the intended scope of the contract as previously modified.

10-23 FAA. The Federal Aviation Administration of the U.S. Department of Transportation. When used to designate a person, FAA shall mean the Administrator or his or her duly authorized representative.

10-24 Federal specifications. The Federal Specifications and Standards, Commercial Item Descriptions, and supplements, amendments, and indices thereto are prepared and issued by the General Services Administration of the Federal Government.

10-25 Force account. Force account work is planning, engineering, or construction work done by the Sponsor's employees.

10-26 Inspector. An authorized representative of the Engineer assigned to make all necessary inspections and observation of tests of the work performed or being performed, or of the materials furnished or being furnished by the Contractor.

10-27 Intention of terms. Whenever, in these specifications or on the plans, the words "directed," "required," "permitted," "ordered," "designated," "prescribed," or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Engineer is intended; and similarly, the words "approved," "acceptable," "satisfactory," or words of like import, shall mean approved by, or acceptable to, or satisfactory to the Engineer, subject in each case to the final determination of the Owner.

Any reference to a specific requirement of a numbered paragraph of the contract specifications or a cited standard shall be interpreted to include all general requirements of the entire section, specification item, or cited standard that may be pertinent to such specific reference.

10-28 Laboratory. The official testing laboratories of the Owner or such other laboratories as may be designated by the Engineer. Also referred to as "Engineer's Laboratory" or "quality assurance laboratory."

10-29 Lighting. A system of fixtures providing or controlling the light sources used on or near the airport or within the airport buildings. The field lighting includes all luminous signals, markers, floodlights, and illuminating devices used on or near the airport or to aid in the operation of aircraft landing at, taking off from, or taxiing on the airport surface.

10-30 Major and minor contract items. A major contract item shall be any item that is listed in the proposal, the total cost of which is equal to or greater than 20% of the total amount of the award contract. All other items shall be considered minor contract items.

10-31 Materials. Any substance specified for use in the construction of the contract work.

10-32 Notice to Proceed (NTP). A written notice to the Contractor to begin the actual contract work on a previously agreed to date. If applicable, the Notice to Proceed shall state the date on which the contract time begins.

10-33 Owner. The term "Owner" shall mean the party of the first part or the contracting agency signatory to the contract. Where the term "Owner" is capitalized in this document, it shall mean airport Sponsor only.

10-34 Passenger Facility Charge (PFC). Per 14 CFR Part 158 and 49 USC § 40117, a PFC is a charge imposed by a public agency on passengers enplaned at a commercial service airport it controls."

10-35 Pavement. The combined surface course, base course, and subbase course, if any, considered as a single unit.

10-36 Payment bond. The approved form of security furnished by the Contractor and his or her surety as a guaranty that the Contractor will pay in full all bills and accounts for materials and labor used in the construction of the work.

10-37 Performance bond. The approved form of security furnished by the Contractor and his or her surety as a guaranty that the Contractor will complete the work in accordance with the terms of the contract.

10-38 Plans. The official drawings or exact reproductions which show the location, character, dimensions and details of the airport and the work to be done and which are to be considered as a part of the contract, supplementary to the specifications.

10-39 Project. The agreed scope of work for accomplishing specific airport development with respect to a particular airport.

10-40 Proposal. The written offer of the bidder (when submitted on the approved proposal form) to perform the contemplated work and furnish the necessary materials in accordance with the provisions of the plans and specifications.

10-41 Proposal guaranty. The security furnished with a proposal to guarantee that the bidder will enter into a contract if his or her proposal is accepted by the Owner.

10-42 Runway. The area on the airport prepared for the landing and takeoff of aircraft.

10-43 Specifications. A part of the contract containing the written directions and requirements for completing the contract work. Standards for specifying materials or testing which are cited in the contract specifications by reference shall have the same force and effect as if included in the contract physically.

10-44 Sponsor. A Sponsor is defined in 49 USC § 47102(24) as a public agency that submits to the FAA for an AIP grant; or a private Owner of a public-use airport that submits to the FAA an application for an AIP grant for the airport.

10-45 Structures. Airport facilities such as bridges; culverts; catch basins, inlets, retaining walls, cribbing; storm and sanitary sewer lines; water lines; underdrains; electrical ducts, manholes, handholes, lighting fixtures and bases; transformers; flexible and rigid pavements; navigational aids; buildings; vaults; and, other manmade features of the airport that may be encountered in the work and not otherwise classified herein.

10-46 Subgrade. The soil that forms the pavement foundation.

10-47 Superintendent. The Contractor's executive representative who is present on the work during progress, authorized to receive and fulfill instructions from the Engineer, and who shall supervise and direct the construction.

10-48 Supplemental agreement. A written agreement between the Contractor and the Owner covering (1) work that would increase or decrease the total amount of the awarded contract, or any major contract item, by more than 25%, such increased or decreased work being within the scope of the originally awarded contract; or (2) work that is not within the scope of the originally awarded contract.

10-49 Surety. The corporation, partnership, or individual, other than the Contractor, executing payment or performance bonds that are furnished to the Owner by the Contractor.

10-50 Taxiway. For the purpose of this document, the term taxiway means the portion of the air operations area of an airport that has been designated by competent airport authority for movement of aircraft to and from the airport's runways, aircraft parking areas, and terminal areas.

10-51 Work. The furnishing of all labor, materials, tools, equipment, and incidentals necessary or convenient to the Contractor's performance of all duties and obligations imposed by the contract, plans, and specifications.

10-52 Working day. A working day shall be any day other than a legal holiday, Saturday, or Sunday on which the normal working forces of the Contractor may proceed with regular work for at

least six (6) hours toward completion of the contract. When work is suspended for causes beyond the Contractor's control, it will not be counted as a working day. Saturdays, Sundays and holidays on which the Contractor's forces engage in regular work will be considered as working days.

END OF SECTION 10

GENERAL PROVISIONS (AIP)

Section 20 Proposal Requirements and Conditions

20-01 Advertisement (Notice to Bidders).

Sealed proposals, in duplicate, will be received by the **City of DeFuniak Springs in the Office of the City Manager, at City Hall,** located at **71 US Highway 90 West, DeFuniak Springs, Florida 32433** until **2:00 PM** on **May 20, 2021**, **CST**, at which time, **in the City Council Chambers** all proposals received will be publicly opened and read aloud. Bidders are invited to submit proposals for:

TERMINAL, HANGAR, AND APRON EXPANSION
AT
DEFUNIAK SPRINGS AIRPORT

The proposed construction scope consists of an approx. 7,200 sf airport terminal, approx. 10,700 sf aircraft hangar, and associated parking lot, aircraft apron expansion, drainage, utility, and security improvements.

Bidders are invited to submit Proposals for this work on the Proposal Forms provided. Other proposal forms will not be accepted.

The complete examination and understanding of the Contract Documents consisting of the Plans and Specifications, and all addenda or other revisions, and site of the proposed work is necessary to properly submit a Proposal. Contract Documents consisting of the Plans and Specifications will be available beginning **Monday, April 19, 2021** for examination or may be obtained via email by contacting **AVCON INC. with offices at 320 Bayshore Drive, Suite A, Niceville, Florida 32578, Phone (850) 678-0050**. There is **no** charge for an electronic copy of the Contract Documents. Hard copy sets of the Contract Documents are not available.

A Bid Bond in the form as bound in the Contract Documents or Certified Check in the amount of not less than five percent (5%) of the total amount bid must accompany each Bid.

Successful Bidder shall be required to execute and to provide a Payment Bond and Performance Bond each in an amount of not less than one hundred percent (100%) of the total value of the Contract awarded with a satisfactory surety or sureties for the full and faithful performance of the work.

The time of completion for this Work is anticipated to be **420 calendar days** to achieve Substantial Completion; exact time requirements are defined in the Instructions to Bidders.

A Non-Mandatory Pre-Bid Conference will be conducted at the City of DeFuniak Springs City Hall, 71 US Highway 90 W, Defuniak Springs, Florida 32433 on Wednesday, April 28, 2021 at 10 am central time. A Site Visit will be conducted immediately following the Pre-Bid Conference.

The City of DeFuniak Springs, in accordance with Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d) and 49 CFR, Part 26, Participation by Disadvantaged Business Enterprises (DBE) in Department of Transportation Programs, hereby notifies all bidders that it will affirmatively ensure that disadvantaged business enterprises are afforded full opportunity to submit bids in response to

this invitation and will not be discriminated against on the grounds of race, color, sex or national origin in consideration for an award.

No bid may be withdrawn after closing time for the receipt of Proposals for a period of one hundred and twenty (120) days.

The **City of DeFuniak Springs** reserves the right to waive any informalities or irregularities in or reject any or all bids and to award or refrain from awarding the Contract for the Work.

This project is funded by FDOT PTGA 429681-2-94-01 and the Federal Aviation Administration.

20-02 Qualification of bidders. Each bidder shall furnish the Owner satisfactory evidence of his or her competency to perform the proposed work. Such evidence of competency, unless otherwise specified, shall consist of statements covering the bidder's past experience on similar work, a list of equipment that would be available for the work, and a list of key personnel that would be available. In addition, each bidder shall furnish the Owner satisfactory evidence of his or her financial responsibility. Such evidence of financial responsibility, unless otherwise specified, shall consist of a confidential statement or report of the bidder's financial resources and liabilities as of the last calendar year or the bidder's last fiscal year. Such statements or reports shall be certified by a public accountant. At the time of submitting such financial statements or reports, the bidder shall further certify whether his or her financial responsibility is approximately the same as stated or reported by the public accountant. If the bidder's financial responsibility has changed, the bidder shall qualify the public accountant's statement or report to reflect the bidder's true financial condition at the time such qualified statement or report is submitted to the Owner.

Unless otherwise specified, a bidder may submit evidence that he or she is prequalified with the State Highway Division and is on the current "bidder's list" of the state in which the proposed work is located. Such evidence of State Highway Division prequalification may be submitted as evidence of financial responsibility in lieu of the certified statements or reports specified above.

Each bidder shall submit "evidence of competency" and "evidence of financial responsibility" to the Owner at the time of bid opening.

20-03 Contents of proposal forms. The Owner shall furnish bidders with proposal forms. All papers bound with or attached to the proposal forms are necessary parts and must not be detached.

The plans, specifications, and other documents designated in the proposal form shall be considered a part of the proposal whether attached or not.

20-04 Issuance of proposal forms. The Owner reserves the right to refuse to issue a proposal form to a prospective bidder should such bidder be in default for any of the following reasons:

a. Failure to comply with any prequalification regulations of the Owner, if such regulations are cited, or otherwise included, in the proposal as a requirement for bidding.

b. Failure to pay, or satisfactorily settle, all bills due for labor and materials on former contracts in force with the Owner at the time the Owner issues the proposal to a prospective bidder.

c. Documented record of Contractor default under previous contracts with the Owner.

d. Documented record of unsatisfactory work on previous contracts with the Owner.

20-05 Interpretation of estimated proposal quantities. An estimate of quantities of work to be done and materials to be furnished under these specifications is given in the proposal. It is the result of careful calculations and is believed to be correct. It is given only as a basis for comparison of proposals and the award of the contract. The Owner does not expressly, or by implication, agree that the actual quantities involved will correspond exactly therewith; nor shall the bidder plead misunderstanding or deception because of such estimates of quantities, or of the character, location, or other conditions pertaining to the work. Payment to the Contractor will be made only for the actual quantities of work performed or materials furnished in accordance with the plans and specifications. It is understood that the quantities may be increased or decreased as hereinafter provided in the subsection 40-02 titled ALTERATION OF WORK AND QUANTITIES of Section 40 without in any way invalidating the unit bid prices.

20-06 Examination of plans, specifications, and site. The bidder is expected to carefully examine the site of the proposed work, the proposal, plans, specifications, and contract forms. Bidders shall satisfy themselves as to the character, quality, and quantities of work to be performed, materials to be furnished, and as to the requirements of the proposed contract. The submission of a proposal shall be prima facie evidence that the bidder has made such examination and is satisfied as to the conditions to be encountered in performing the work and as to the requirements of the proposed contract, plans, and specifications.

See the Project Manual, Miscellaneous Documents for the Nova Geotechnical Report.

20-07 Preparation of proposal. The bidder shall submit his or her proposal on the forms furnished by the Owner. All blank spaces in the proposal forms must be correctly filled in where indicated for each and every item for which a quantity is given. The bidder shall state the price (written in ink or typed) both in words and numerals for which they propose to do for each pay item furnished in the proposal. In case of conflict between words and numerals, the words, unless obviously incorrect, shall govern.

The bidder shall sign the proposal correctly and in ink. If the proposal is made by an individual, his or her name and post office address must be shown. If made by a partnership, the name and post office address of each member of the partnership must be shown. If made by a corporation, the person signing the proposal shall give the name of the state under the laws of which the corporation was chartered and the name, titles, and business address of the president, secretary, and the treasurer. Anyone signing a proposal as an agent shall file evidence of his or her authority to do so and that the signature is binding upon the firm or corporation.

20-08 Responsive and responsible bidder. A responsive bid conforms to all significant terms and conditions contained in the Sponsor's invitation for bid. It is the Sponsor's responsibility to decide if the exceptions taken by a bidder to the solicitation are material or not and the extent of deviation it is willing to accept.

A responsible bidder has the ability to perform successfully under the terms and conditions of a proposed procurement, as defined in 49 CFR § 18.36(b)(8). This includes such matters as Contractor integrity, compliance with public policy, record of past performance, and financial and technical resources.

20-09 Irregular proposals. Proposals shall be considered irregular for the following reasons:

a. If the proposal is on a form other than that furnished by the Owner, or if the Owner's form is altered, or if any part of the proposal form is detached.

b. If there are unauthorized additions, conditional or alternate pay items, or irregularities of any kind that make the proposal incomplete, indefinite, or otherwise ambiguous.

c. If the proposal does not contain a unit price for each pay item listed in the proposal, except in the case of authorized alternate pay items, for which the bidder is not required to furnish a unit price.

d. If the proposal contains unit prices that are obviously unbalanced.

e. If the proposal is not accompanied by the proposal guaranty specified by the Owner.

The Owner reserves the right to reject any irregular proposal and the right to waive technicalities if such waiver is in the best interest of the Owner and conforms to local laws and ordinances pertaining to the letting of construction contracts.

20-10 Bid guarantee. Each separate proposal shall be accompanied by a certified check, or other specified acceptable collateral, in the amount specified in the proposal form. Such check, or collateral, shall be made payable to the Owner.

20-11 Delivery of proposal. Each proposal submitted shall be placed in a sealed envelope plainly marked with the project number, location of airport, and name and business address of the bidder on the outside. When sent by mail, preferably registered, the sealed proposal, marked as indicated above, should be enclosed in an additional envelope. No proposal will be considered unless received at the place specified in the advertisement or as modified by Addendum before the time specified for opening all bids. Proposals received after the bid opening time shall be returned to the bidder unopened.

20-12 Withdrawal or revision of proposals. A bidder may withdraw or revise (by withdrawal of one proposal and submission of another) a proposal provided that the bidder's request for withdrawal is received by the Owner in writing or by email before the time specified for opening bids. Revised proposals must be received at the place specified in the advertisement before the time specified for opening all bids.

20-13 Public opening of proposals. Proposals shall be opened, and read, publicly at the time and place specified in the advertisement. Bidders, their authorized agents, and other interested persons are invited to attend. Proposals that have been withdrawn (by written or telegraphic request) or received after the time specified for opening bids shall be returned to the bidder unopened.

20-14 Disqualification of bidders. A bidder shall be considered disqualified for any of the following reasons:

a. Submitting more than one proposal from the same partnership, firm, or corporation under the same or different name.

b. Evidence of collusion among bidders. Bidders participating in such collusion shall be disqualified as bidders for any future work of the Owner until any such participating bidder has been reinstated by the Owner as a qualified bidder.

c. If the bidder is considered to be in "default" for any reason specified in the subsection 20-04 titled ISSUANCE OF PROPOSAL FORMS of this section.

END OF SECTION 20

GENERAL PROVISIONS

Section 30 Award and Execution of Contract

30-01 Consideration of proposals. After the proposals are publicly opened and read, they will be compared on the basis of the summation of the products obtained by multiplying the estimated quantities shown in the proposal by the unit bid prices. If a bidder's proposal contains a discrepancy between unit bid prices written in words and unit bid prices written in numbers, the unit price written in words shall govern.

Until the award of a contract is made, the Owner reserves the right to reject a bidder's proposal for any of the following reasons:

a. If the proposal is irregular as specified in the subsection 20-09 titled IRREGULAR PROPOSALS of Section 20.

b. If the bidder is disqualified for any of the reasons specified in the subsection 20-14 titled DISQUALIFICATION OF BIDDERS of Section 20.

In addition, until the award of a contract is made, the Owner reserves the right to reject any or all proposals, waive technicalities, if such waiver is in the best interest of the Owner and is in conformance with applicable state and local laws or regulations pertaining to the letting of construction contracts; advertise for new proposals; or proceed with the work otherwise. All such actions shall promote the Owner's best interests.

30-02 Award of contract. The award of a contract, if it is to be awarded, shall be made within 120 calendar days of the date specified for publicly opening proposals, unless otherwise specified herein.

Award of the contract shall be made by the Owner to the lowest, qualified bidder whose proposal conforms to the cited requirements of the Owner.

30-03 Cancellation of award. The Owner reserves the right to cancel the award without liability to the bidder, except return of proposal guaranty, at any time before a contract has been fully executed by all parties and is approved by the Owner in accordance with the subsection 30-07 titled APPROVAL OF CONTRACT of this section.

30-04 Return of proposal guaranty. All proposal guaranties, except those of the two lowest bidders, will be returned immediately after the Owner has made a comparison of bids as specified in the subsection 30-01 titled CONSIDERATION OF PROPOSALS of this section. Proposal guaranties of the two lowest bidders will be retained by the Owner until such time as an award is made, at which time, the unsuccessful bidder's proposal guaranty will be returned. The successful bidder's proposal guaranty will be returned as soon as the Owner receives the contract bonds as specified in the subsection 30-05 titled REQUIREMENTS OF CONTRACT BONDS of this section.

30-05 Requirements of contract bonds. At the time of the execution of the contract, the successful bidder shall furnish the Owner a surety bond or bonds that have been fully executed by the bidder and the surety guaranteeing the performance of the work and the payment of all legal debts that may be incurred by reason of the Contractor's performance of the work. The surety and the form of the bond or bonds shall be acceptable to the Owner. Unless otherwise specified in this subsection, the surety bond or bonds shall be in a sum equal to the full amount of the contract.

30-06 Execution of contract. The successful bidder shall sign (execute) the necessary agreements for entering into the contract and return the signed contract to the Owner, along with the fully executed surety bond or bonds specified in the subsection 30-05 titled REQUIREMENTS OF CONTRACT BONDS of this section, within 15 calendar days from the date mailed or otherwise delivered to the successful bidder.

30-07 Approval of contract. Upon receipt of the contract and contract bond or bonds that have been executed by the successful bidder, the Owner shall complete the execution of the contract in accordance with local laws or ordinances, and return the fully executed contract to the Contractor. Delivery of the fully executed contract to the Contractor shall constitute the Owner's approval to be bound by the successful bidder's proposal and the terms of the contract.

30-08 Failure to execute contract. Failure of the successful bidder to execute the contract and furnish an acceptable surety bond or bonds within the 15 calendar day period specified in the subsection 30-06 titled EXECUTION OF CONTRACT of this section shall be just cause for cancellation of the award and forfeiture of the proposal guaranty, not as a penalty, but as liquidation of damages to the Owner.

END OF SECTION 30

GENERAL PROVISIONS

Section 40 Scope of Work

40-01 Intent of contract. The intent of the contract is to provide for construction and completion, in every detail, of the work described. It is further intended that the Contractor shall furnish all labor, materials, equipment, tools, transportation, and supplies required to complete the work in accordance with the plans, specifications, and terms of the contract.

40-02 Alteration of work and quantities. The Owner reserves and shall have the right to make such alterations in the work as may be necessary or desirable to complete the work originally intended in an acceptable manner. Unless otherwise specified herein, the Engineer shall be and is hereby authorized to make such alterations in the work as may increase or decrease the originally awarded contract quantities, provided that the aggregate of such alterations does not change the total contract cost or the total cost of any major contract item by more than 25% (total cost being based on the unit prices and estimated quantities in the awarded contract). Alterations that do not exceed the 25% limitation shall not invalidate the contract nor release the surety, and the Contractor agrees to accept payment for such alterations as if the altered work had been a part of the original contract. These alterations that are for work within the general scope of the contract shall be covered by “Change Orders” issued by the Engineer. Change orders for altered work shall include extensions of contract time where, in the Engineer’s opinion, such extensions are commensurate with the amount and difficulty of added work.

Should the aggregate amount of altered work exceed the 25% limitation hereinbefore specified, such excess altered work shall be covered by supplemental agreement. If the Owner and the Contractor are unable to agree on a unit adjustment for any contract item that requires a supplemental agreement, the Owner reserves the right to terminate the contract with respect to the item and make other arrangements for its completion.

Supplemental agreements shall be approved by the FAA and shall include all applicable Federal contract provisions for procurement and contracting required under AIP. Supplemental agreements shall also require consent of the Contractor’s surety and separate performance and payment bonds.

40-03 Omitted items. The Engineer may, in the Owner’s best interest, omit from the work any contract item, except major contract items. Major contract items may be omitted by a supplemental agreement. Such omission of contract items shall not invalidate any other contract provision or requirement.

Should a contract item be omitted or otherwise ordered to be non-performed, the Contractor shall be paid for all work performed toward completion of such item prior to the date of the order to omit such item. Payment for work performed shall be in accordance with the subsection 90-04 titled PAYMENT FOR OMITTED ITEMS of Section 90.

40-04 Extra work. Should acceptable completion of the contract require the Contractor to perform an item of work for which no basis of payment has been provided in the original contract or previously issued change orders or supplemental agreements, the same shall be called “Extra Work.” Extra Work that is within the general scope of the contract shall be covered by written change order. Change orders for such Extra Work shall contain agreed unit prices for performing the change order work in accordance with the requirements specified in the order, and shall contain any adjustment to the contract time that, in the Engineer’s opinion, is necessary for completion of such Extra Work.

When determined by the Engineer to be in the Owner's best interest, the Engineer may order the Contractor to proceed with Extra Work as provided in the subsection 90-05 titled PAYMENT FOR EXTRA WORK of Section 90. Extra Work that is necessary for acceptable completion of the project, but is not within the general scope of the work covered by the original contract shall be covered by a Supplemental Agreement as defined in the subsection 10-48 titled SUPPLEMENTAL AGREEMENT of Section 10.

Any claim for payment of Extra Work that is not covered by written agreement (change order or supplemental agreement) shall be rejected by the Owner.

40-05 Maintenance of traffic. It is the explicit intention of the contract that the safety of aircraft, as well as the Contractor's equipment and personnel, is the most important consideration.

a. It is understood and agreed that the Contractor shall provide for the free and unobstructed movement of aircraft in the air operations areas (AOAs) of the airport with respect to his or her own operations and the operations of all subcontractors as specified in the subsection 80-04 titled LIMITATION OF OPERATIONS of Section 80. It is further understood and agreed that the Contractor shall provide for the uninterrupted operation of visual and electronic signals (including power supplies thereto) used in the guidance of aircraft while operating to, from, and upon the airport as specified in the subsection 70-15 titled CONTRACTOR'S RESPONSIBILITY FOR UTILITY SERVICE AND FACILITIES OF OTHERS in Section 70.

b. With respect to his or her own operations and the operations of all subcontractors, the Contractor shall provide marking, lighting, and other acceptable means of identifying personnel, equipment, vehicles, storage areas, and any work area or condition that may be hazardous to the operation of aircraft, fire-rescue equipment, or maintenance vehicles at the airport.

c. When the contract requires the maintenance of vehicular traffic on an existing road, street, or highway during the Contractor's performance of work that is otherwise provided for in the contract, plans, and specifications, the Contractor shall keep such road, street, or highway open to all traffic and shall provide such maintenance as may be required to accommodate traffic. The Contractor shall be responsible for the repair of any damage caused by the Contractor's equipment and personnel. The Contractor shall furnish, erect, and maintain barricades, warning signs, flag person, and other traffic control devices in reasonable conformity with the Manual on Uniform Traffic Control Devices (MUTCD) (http://mutcd.fhwa.dot.gov/), unless otherwise specified. The Contractor shall also construct and maintain in a safe condition any temporary connections necessary for ingress to and egress from abutting property or intersecting roads, streets or highways.

40-06 Removal of existing structures. All existing structures encountered within the established lines, grades, or grading sections shall be removed by the Contractor, unless such existing structures are otherwise specified to be relocated, adjusted up or down, salvaged, abandoned in place, reused in the work or to remain in place. The cost of removing such existing structures shall not be measured or paid for directly, but shall be included in the various contract items.

Should the Contractor encounter an existing structure (above or below ground) in the work for which the disposition is not indicated on the plans, the Engineer shall be notified prior to disturbing such structure. The disposition of existing structures so encountered shall be immediately determined by the Engineer in accordance with the provisions of the contract.

Except as provided in the subsection 40-07 titled RIGHTS IN AND USE OF MATERIALS FOUND IN THE WORK of this section, it is intended that all existing materials or structures that may be encountered (within the lines, grades, or grading sections established for completion of the work) shall be used in the work as otherwise provided for in the contract and shall remain the property of the Owner when so used in the work.

40-07 Rights in and use of materials found in the work. Should the Contractor encounter any material such as (but not restricted to) sand, stone, gravel, slag, or concrete slabs within the established lines, grades, or grading sections, the use of which is intended by the terms of the contract to be either embankment or waste, the Contractor may at his or her option either:

a. Use such material in another contract item, providing such use is approved by the Engineer and is in conformance with the contract specifications applicable to such use; or,

b. Remove such material from the site, upon written approval of the Engineer; or

c. Use such material for the Contractor's own temporary construction on site; or,

d. Use such material as intended by the terms of the contract.

Should the Contractor wish to exercise option a., b., or c., the Contractor shall request the Engineer's approval in advance of such use.

Should the Engineer approve the Contractor's request to exercise option a., b., or c., the Contractor shall be paid for the excavation or removal of such material at the applicable contract price. The Contractor shall replace, at his or her own expense, such removed or excavated material with an agreed equal volume of material that is acceptable for use in constructing embankment, backfills, or otherwise to the extent that such replacement material is needed to complete the contract work. The Contractor shall not be charged for use of such material used in the work or removed from the site.

Should the Engineer approve the Contractor's exercise of option a., the Contractor shall be paid, at the applicable contract price, for furnishing and installing such material in accordance with requirements of the contract item in which the material is used.

It is understood and agreed that the Contractor shall make no claim for delays by reason of his or her exercise of option a., b., or c.

The Contractor shall not excavate, remove, or otherwise disturb any material, structure, or part of a structure which is located outside the lines, grades, or grading sections established for the work, except where such excavation or removal is provided for in the contract, plans, or specifications.

40-08 Final cleanup. Upon completion of the work and before acceptance and final payment will be made, the Contractor shall remove from the site all machinery, equipment, surplus and discarded materials, rubbish, temporary structures, and stumps or portions of trees. The Contractor shall cut all brush and woods within the limits indicated and shall leave the site in a neat and presentable condition. Material cleared from the site and deposited on adjacent property will not be considered as having been disposed of satisfactorily, unless the Contractor has obtained the written permission of such property Owner.

END OF SECTION 40

GENERAL PROVISIONS

Section 50 Control of Work

50-01 Authority of the Engineer. The Engineer shall decide any and all questions which may arise as to the quality and acceptability of materials furnished, work performed, and as to the manner of performance and rate of progress of the work. The Engineer shall decide all questions that may arise as to the interpretation of the specifications or plans relating to the work. The Engineer shall determine the amount and quality of the several kinds of work performed and materials furnished which are to be paid for the under contract.

The Engineer does not have the authority to accept pavements that do not conform to FAA specification requirements.

50-02 Conformity with plans and specifications. All work and all materials furnished shall be in reasonably close conformity with the lines, grades, grading sections, cross-sections, dimensions, material requirements, and testing requirements that are specified (including specified tolerances) in the contract, plans or specifications.

If the Engineer finds the materials furnished, work performed, or the finished product not within reasonably close conformity with the plans and specifications but that the portion of the work affected will, in his or her opinion, result in a finished product having a level of safety, economy, durability, and workmanship acceptable to the Owner, the Engineer will advise the Owner of his or her determination that the affected work be accepted and remain in place. In this event, the Engineer will document the determination and recommend to the Owner a basis of acceptance that will provide for an adjustment in the contract price for the affected portion of the work. The Engineer's determination and recommended contract price adjustments will be based on sound engineering judgment and such tests or retests of the affected work as are, in the Engineer's opinion, needed. Changes in the contract price shall be covered by contract change order or supplemental agreement as applicable.

If the Engineer finds the materials furnished, work performed, or the finished product are not in reasonably close conformity with the plans and specifications and have resulted in an unacceptable finished product, the affected work or materials shall be removed and replaced or otherwise corrected by and at the expense of the Contractor in accordance with the Engineer's written orders.

For the purpose of this subsection, the term "reasonably close conformity" shall not be construed as waiving the Contractor's responsibility to complete the work in accordance with the contract, plans, and specifications. The term shall not be construed as waiving the Engineer's responsibility to insist on strict compliance with the requirements of the contract, plans, and specifications during the Contractor's execution of the work, when, in the Engineer's opinion, such compliance is essential to provide an acceptable finished portion of the work.

For the purpose of this subsection, the term "reasonably close conformity" is also intended to provide the Engineer with the authority, after consultation with the FAA, to use sound engineering judgment in his or her determinations as to acceptance of work that is not in strict conformity, but will provide a finished product equal to or better than that intended by the requirements of the contract, plans and specifications.

The Engineer will not be responsible for the Contractor's means, methods, techniques, sequences, or procedures of construction or the safety precautions incident thereto.

50-03 Coordination of contract, plans, and specifications. The contract, plans, specifications, and all referenced standards cited are essential parts of the contract requirements. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work. In case of discrepancy, calculated dimensions will govern over scaled dimensions; contract technical specifications shall govern over contract general provisions, plans, cited standards for materials or testing, and cited advisory circulars (ACs); contract general provisions shall govern over plans, cited standards for materials or testing, and cited ACs; plans shall govern over cited standards for materials or testing and cited ACs. If any paragraphs contained in the Special Provisions conflict with General Provisions or Technical Specifications, the Special Provisions shall govern.

From time to time, discrepancies within cited testing standards occur due to the timing of the change, edits, and/or replacement of the standards. If the Contractor discovers any apparent discrepancy within standard test methods, the Contractor shall immediately ask the Engineer for an interpretation and decision, and such decision shall be final.

LIST OF SPECIAL PROVISIONS

Special Provision No. 1: Utilities

Special Provision No. 2: Airport Safety and Security Requirements

Special Provision No. 3: Protection of Airport Cables, NAVAIDS and Other Facilities

Special Provision No. 4: Staging and Phasing Provisions for Contractor Operations

Special Provision No. 5: Visible Warning Markers for Taxiways and Aircraft Operations Areas

Special Provision No. 6: Time of Completion

Special Provision No. 7: Airport Project Procedures

Special Provision No. 8: Vehicle Operation on the AOA

Special Provision No. 9: Federal Labor and EEO Provisions

50-04 Cooperation of Contractor. The Contractor will be supplied with five copies each of the plans and specifications. The Contractor shall have available on the work at all times one copy each of the plans and specifications. Additional copies of plans and specifications may be obtained by the Contractor for the cost of reproduction.

The Contractor shall give constant attention to the work to facilitate the progress thereof, and shall cooperate with the Engineer and his or her inspectors and with other contractors in every way possible. The Contractor shall have a competent superintendent on the work at all times who is fully authorized as his or her agent on the work. The superintendent shall be capable of reading and thoroughly understanding the plans and specifications and shall receive and fulfill instructions from the Engineer or his or her authorized representative.

50-05 Cooperation between contractors. The Owner reserves the right to contract for and perform other or additional work on or near the work covered by this contract.

When separate contracts are let within the limits of any one project, each Contractor shall conduct the work so as not to interfere with or hinder the progress of completion of the work being performed by other Contractors. Contractors working on the same project shall cooperate with each other as directed.

Each Contractor involved shall assume all liability, financial or otherwise, in connection with his or her contract and shall protect and save harmless the Owner from any and all damages or claims that may arise because of inconvenience, delays, or loss experienced because of the presence and operations of other Contractors working within the limits of the same project.

The Contractor shall arrange his or her work and shall place and dispose of the materials being used so as not to interfere with the operations of the other Contractors within the limits of the same project. The Contractor shall join his or her work with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.

50-06 Construction layout and stakes. The Engineer shall establish horizontal and vertical control only. The Contractor must establish all layout required for the construction of the work. Such stakes and markings as the Engineer may set for either their own or the Contractor's guidance shall be preserved by the Contractor. In case of negligence on the part of the Contractor, or their employees, resulting in the destruction of such stakes or markings, an amount equal to the cost of replacing the same may be deducted from subsequent estimates due the Contractor at the discretion of the Engineer.

The Contractor will be required to furnish all lines, grades and measurements from the control points necessary for the proper execution and control of the work contracted for under these specifications.

The Contractor must give copies of survey notes to the Engineer for each area of construction and for each placement of material as specified to allow the Engineer to make periodic checks for conformance with plan grades, alignments and grade tolerances required by the applicable material specifications. All surveys must be provided to the Engineer prior to commencing work items that will cover or disturb the survey staking as set by the Contractor's surveyor. Survey(s) and notes shall be provided in the following format(s): DWG and PDF**.** In the case of error, on the part of the Contractor, their surveyor, employees or subcontractors, resulting in established grades, alignment or grade tolerances that do not concur with those specified or shown on the plans, the Contractor is solely responsible for correction, removal, replacement and all associated costs at no additional cost to the Owner.

No direct payment will be made, unless otherwise specified in contract documents, for this labor, materials, or other expenses. The cost shall be included in the price of the bid for the various items of the Contract.

Construction Staking and Layout includes but is not limited to:

a. Clearing and Grubbing perimeter staking

b. Rough Grade slope stakes at 100-foot (30-m) stations

c. Drainage Swales slope stakes and flow line blue tops at 50-foot (15-m) stations

Subgrade blue tops at 25-foot (7.5-m) stations and 25-foot (7.5-m) offset distance (maximum) for the following section locations:

a. Runway – minimum five (5) per station

b. Taxiways – minimum three (3) per station

c. Holding apron areas – minimum three (3) per station

d. Roadways – minimum three (3) per station

Base Course blue tops at 25-foot (7.5-m) stations and 25-foot (7.5-m) offset distance (maximum) for the following section locations:

a. Runway – minimum five (5) per station

b. Taxiways – minimum three (3) per station

c. Holding apron areas – minimum three (3) per station

Pavement areas:

a. Edge of Pavement hubs and tacks (for stringline by Contractor) at 100-foot (30-m) stations.

b. Between Lifts at 25-foot (7.5-m) stations for the following section locations:

1) Runways – each paving lane width

2) Taxiways – each paving lane width

3) Holding areas – each paving lane width

c. After finish paving operations at 50-foot (15-m) stations:

1) All paved areas – Edge of each paving lane prior to next paving lot

d. Shoulder and safety area blue tops at 50-foot (15-m) stations and at all break points with maximum of 50-foot (15-m) offsets.

e. Fence lines at 100-foot (30-m) stations minimum.

f. Electrical and Communications System locations, lines and grades including but not limited to duct runs, connections, fixtures, signs, lights, Visual Approach Slope Indicators (VASIs), Precision Approach Path Indicators (PAPIs), Runway End Identifier Lighting (REIL), Wind Cones, Distance Markers (signs), pull boxes and manholes.

g. Drain lines, cut stakes and alignment on 25-foot (7.5-m) stations, inlet and manholes.

h. Painting and Striping layout (pinned with 1.5 inch PK nails) marked for paint Contractor. (All nails shall be removed after painting).

i. Laser, or other automatic control devices, shall be checked with temporary control point or grade hub at a minimum of once per 400 feet (120 m) per pass (that is, paving lane).

The establishment of Survey Control and/or reestablishment of survey control shall be by a State Licensed Land Surveyor.

Controls and stakes disturbed or suspect of having been disturbed shall be checked and/or reset as directed by the Engineer without additional cost to the Owner.

50-07 Automatically controlled equipment. Whenever batching or mixing plant equipment is required to be operated automatically under the contract and a breakdown or malfunction of the automatic controls occurs, the equipment may be operated manually or by other methods for a

period 48 hours following the breakdown or malfunction, provided this method of operations will produce results which conform to all other requirements of the contract.

50-08 Authority and duties of inspectors. Inspectors shall be authorized to inspect all work done and all material furnished. Such inspection may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials to be used. Inspectors are not authorized to revoke, alter, or waive any provision of the contract. Inspectors are not authorized to issue instructions contrary to the plans and specifications or to act as foreman for the Contractor.

Inspectors are authorized to notify the Contractor or his or her representatives of any failure of the work or materials to conform to the requirements of the contract, plans, or specifications and to reject such nonconforming materials in question until such issues can be referred to the Engineer for a decision.

50-09 Inspection of the work. All materials and each part or detail of the work shall be subject to inspection. The Engineer shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection.

If the Engineer requests it, the Contractor, at any time before acceptance of the work, shall remove or uncover such portions of the finished work as may be directed. After examination, the Contractor shall restore said portions of the work to the standard required by the specifications. Should the work thus exposed or examined prove acceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be paid for as extra work; but should the work so exposed or examined prove unacceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be at the Contractor's expense.

Any work done or materials used without supervision or inspection by an authorized representative of the Owner may be ordered removed and replaced at the Contractor's expense unless the Owner's representative failed to inspect after having been given reasonable notice in writing that the work was to be performed.

Should the contract work include relocation, adjustment, or any other modification to existing facilities, not the property of the (contract) Owner, authorized representatives of the Owners of such facilities shall have the right to inspect such work. Such inspection shall in no sense make any facility owner a party to the contract, and shall in no way interfere with the rights of the parties to this contract.

50-10 Removal of unacceptable and unauthorized work. All work that does not conform to the requirements of the contract, plans, and specifications will be considered unacceptable, unless otherwise determined acceptable by the Engineer as provided in the subsection 50-02 titled CONFORMITY WITH PLANS AND SPECIFICATIONS of this section.

Unacceptable work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause found to exist prior to the final acceptance of the work, shall be removed immediately and replaced in an acceptable manner in accordance with the provisions of the subsection 70-14 titled CONTRACTOR'S RESPONSIBILITY FOR WORK of Section 70.

No removal work made under provision of this subsection shall be done without lines and grades having been established by the Engineer. Work done contrary to the instructions of the Engineer, work done beyond the lines shown on the plans or as established by the Engineer, except as herein

specified, or any extra work done without authority, will be considered as unauthorized and will not be paid for under the provisions of the contract. Work so done may be ordered removed or replaced at the Contractor's expense.

Upon failure on the part of the Contractor to comply with any order of the Engineer made under the provisions of this subsection, the Engineer will have authority to cause unacceptable work to be remedied or removed and replaced and unauthorized work to be removed and to deduct the costs incurred by the Owner from any monies due or to become due the Contractor.

50-11 Load restrictions. The Contractor shall comply with all legal load restrictions in the hauling of materials on public roads beyond the limits of the work. A special permit will not relieve the Contractor of liability for damage that may result from the moving of material or equipment.

The operation of equipment of such weight or so loaded as to cause damage to structures or to any other type of construction will not be permitted. Hauling of materials over the base course or surface course under construction shall be limited as directed. No loads will be permitted on a concrete pavement, base, or structure before the expiration of the curing period. The Contractor shall be responsible for all damage done by his or her hauling equipment and shall correct such damage at his or her own expense.

50-12 Maintenance during construction. The Contractor shall maintain the work during construction and until the work is accepted. Maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces so that the work is maintained in satisfactory condition at all times.

In the case of a contract for the placing of a course upon a course or subgrade previously constructed, the Contractor shall maintain the previous course or subgrade during all construction operations.

All costs of maintenance work during construction and before the project is accepted shall be included in the unit prices bid on the various contract items, and the Contractor will not be paid an additional amount for such work.

50-13 Failure to maintain the work. Should the Contractor at any time fail to maintain the work as provided in the subsection 50-12 titled MAINTENANCE DURING CONSTRUCTION of this section, the Engineer shall immediately notify the Contractor of such noncompliance. Such notification shall specify a reasonable time within which the Contractor shall be required to remedy such unsatisfactory maintenance condition. The time specified will give due consideration to the exigency that exists.

Should the Contractor fail to respond to the Engineer's notification, the Owner may suspend any work necessary for the Owner to correct such unsatisfactory maintenance condition, depending on the exigency that exists. Any maintenance cost incurred by the Owner, shall be deducted from monies due or to become due the Contractor.

50-14 Partial acceptance. If at any time during the execution of the project the Contractor substantially completes a usable unit or portion of the work, the occupancy of which will benefit the Owner, the Contractor may request the Engineer to make final inspection of that unit. If the Engineer finds upon inspection that the unit has been satisfactorily completed in compliance with the contract, the Engineer may accept it as being complete, and the Contractor may be relieved of further responsibility for that unit. Such partial acceptance and beneficial occupancy by the Owner shall not void or alter any provision of the contract.

50-15 Final acceptance. Upon due notice from the Contractor of presumptive completion of the entire project, the Engineer and Owner will make an inspection. If all construction provided for and contemplated by the contract is found to be complete in accordance with the contract, plans, and specifications, such inspection shall constitute the final inspection. The Engineer shall notify the Contractor in writing of final acceptance as of the date of the final inspection.

If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the Engineer will give the Contractor the necessary instructions for correction of same and the Contractor shall immediately comply with and execute such instructions. Upon correction of the work, another inspection will be made which shall constitute the final inspection, provided the work has been satisfactorily completed. In such event, the Engineer will make the final acceptance and notify the Contractor in writing of this acceptance as of the date of final inspection.

50-16 Claims for adjustment and disputes. If for any reason the Contractor deems that additional compensation is due for work or materials not clearly provided for in the contract, plans, or specifications or previously authorized as extra work, the Contractor shall notify the Engineer in writing of his or her intention to claim such additional compensation before the Contractor begins the work on which the Contractor bases the claim. If such notification is not given or the Engineer is not afforded proper opportunity by the Contractor for keeping strict account of actual cost as required, then the Contractor hereby agrees to waive any claim for such additional compensation. Such notice by the Contractor and the fact that the Engineer has kept account of the cost of the work shall not in any way be construed as proving or substantiating the validity of the claim. When the work on which the claim for additional compensation is based has been completed, the Contractor shall, within 10 calendar days, submit a written claim to the Engineer who will present it to the Owner for consideration in accordance with local laws or ordinances.

Nothing in this subsection shall be construed as a waiver of the Contractor’s right to dispute final payment based on differences in measurements or computations.

50-17 Cost reduction incentive. NOT USED.

END OF SECTION 50

GENERAL PROVISIONS

Section 60 Control of Materials

60-01 Source of supply and quality requirements. The materials used in the work shall conform to the requirements of the contract, plans, and specifications. Unless otherwise specified, such materials that are manufactured or processed shall be new (as compared to used or reprocessed).

In order to expedite the inspection and testing of materials, the Contractor shall furnish complete statements to the Engineer as to the origin, composition, and manufacture of all materials to be used in the work. Such statements shall be furnished promptly after execution of the contract but, in all cases, prior to delivery of such materials.

At the Engineer's option, materials may be approved at the source of supply before delivery is stated. If it is found after trial that sources of supply for previously approved materials do not produce specified products, the Contractor shall furnish materials from other sources.

The Contractor shall furnish airport lighting equipment that conforms to the requirements of cited materials specifications. In addition, where an FAA specification for airport lighting equipment is cited in the plans or specifications, the Contractor shall furnish such equipment that is:

a. Listed in advisory circular (AC) 150/5345-53, Airport Lighting Equipment Certification Program, and Addendum that is in effect on the date of advertisement; and,

b. Produced by the manufacturer as listed in the Addendum cited above for the certified equipment part number.

The following airport lighting equipment is required for this contract and is to be furnished by the Contractor in accordance with the requirements of this subsection:

L-108-1	1/C L-824-TYPE C UNSHIELDED #8 AWG 5 KV STRANDED CU CABLE
L-108-2	1/C #2 AWG SOLID COPPER COUNTERPOISE CABLE
L-108-3	0.75" DIAMETER BY 10.00' LONG COPPER CLAD STEEL GROUND ROD
L-110-1	1 WAY 2" PVC, SCHEDULE 40 DIRECT BURIED DUCT
L-110-2	1 WAY 2" PVC, SCHEDULE 40 CONDUIT, CONCRETE ENCASED
L-110-3	1 WAY 4" SPLIT DUCT
L-125-1	L-858(L) SIGN – SINGLE/DOUBLE FACE, LED, SIZE 2 – 2 MODULE
L-125-2	L-858(L) SIGN – SINGLE/DOUBLE FACE, LED, SIZE 2 – 4 MODULE
L-125-3	L-861T(L) OMNIDIRECTIONAL, BLUE LED, TAXIWAY EDGE LIGHT

60-02 Samples, tests, and cited specifications. Unless otherwise designated, all materials used in the work shall be inspected, tested, and approved by the Engineer before incorporation in the work. Any work in which untested materials are used without approval or written permission of the Engineer shall be performed at the Contractor's risk. Materials found to be unacceptable and unauthorized will not be paid for and, if directed by the Engineer, shall be removed at the Contractor's expense.

Unless otherwise designated, quality assurance tests in accordance with the cited standard methods of ASTM, American Association of State Highway and Transportation Officials (AASHTO), Federal Specifications, Commercial Item Descriptions, and all other cited methods, which are current on the date of advertisement for bids, will be made by and at the expense of the Engineer.

The testing organizations performing on-site quality assurance field tests shall have copies of all referenced standards on the construction site for use by all technicians and other personnel, including the Contractor's representative at his or her request. Unless otherwise designated, samples for quality assurance will be taken by a qualified representative of the Engineer. All materials being used are subject to inspection, test, or rejection at any time prior to or during incorporation into the work. Copies of all tests will be furnished to the Contractor's representative at their request after review and approval of the Engineer.

The Contractor shall employ a testing organization to perform all Contractor required Quality Control tests. The Contractor shall submit to the Engineer resumes on all testing organizations and individual persons who will be performing the tests. The Engineer will determine if such persons are qualified. All the test data shall be reported to the Engineer after the results are known. A legible, handwritten copy of all test data shall be given to the Engineer daily, along with printed reports, in an approved format, on a weekly basis. After completion of the project, and prior to final payment, the Contractor shall submit a final report to the Engineer showing all test data reports, plus an analysis of all results showing ranges, averages, and corrective action taken on all failing tests.

60-03 Certification of compliance. The Engineer may permit the use, prior to sampling and testing, of certain materials or assemblies when accompanied by manufacturer's certificates of compliance stating that such materials or assemblies fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer. Each lot of such materials or assemblies delivered to the work must be accompanied by a certificate of compliance in which the lot is clearly identified.

Materials or assemblies used on the basis of certificates of compliance may be sampled and tested at any time and if found not to be in conformity with contract requirements will be subject to rejection whether in place or not.

The form and distribution of certificates of compliance shall be as approved by the Engineer.

When a material or assembly is specified by "brand name or equal" and the Contractor elects to furnish the specified "brand name," the Contractor shall be required to furnish the manufacturer's certificate of compliance for each lot of such material or assembly delivered to the work. Such certificate of compliance shall clearly identify each lot delivered and shall certify as to:

a. Conformance to the specified performance, testing, quality or dimensional requirements; and,

b. Suitability of the material or assembly for the use intended in the contract work.

Should the Contractor propose to furnish an “or equal” material or assembly, the Contractor shall furnish the manufacturer’s certificates of compliance as hereinbefore described for the specified brand name material or assembly. However, the Engineer shall be the sole judge as to whether the proposed “or equal” is suitable for use in the work.

The Engineer reserves the right to refuse permission for use of materials or assemblies on the basis of certificates of compliance.

60-04 Plant inspection. The Engineer or his or her authorized representative may inspect, at its source, any specified material or assembly to be used in the work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the work and to obtain samples required for acceptance of the material or assembly.

Should the Engineer conduct plant inspections, the following conditions shall exist:

a. The Engineer shall have the cooperation and assistance of the Contractor and the producer with whom the Engineer has contracted for materials.

b. The Engineer shall have full entry at all reasonable times to such parts of the plant that concern the manufacture or production of the materials being furnished.

c. If required by the Engineer, the Contractor shall arrange for adequate office or working space that may be reasonably needed for conducting plant inspections. Office or working space should be conveniently located with respect to the plant.

It is understood and agreed that the Owner shall have the right to retest any material that has been tested and approved at the source of supply after it has been delivered to the site. The Engineer shall have the right to reject only material which, when retested, does not meet the requirements of the contract, plans, or specifications.

60-05 Engineer’s field office. NOT USED.

60-06 Storage of materials. Materials shall be so stored as to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located to facilitate their prompt inspection. The Contractor shall coordinate the storage of all materials with the Engineer. Materials to be stored on airport property shall not create an obstruction to air navigation nor shall they interfere with the free and unobstructed movement of aircraft. Unless otherwise shown on the plans, the storage of materials and the location of the Contractor’s plant and parked equipment or vehicles shall be as directed by the Engineer. Private property shall not be used for storage purposes without written permission of the Owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses for the storage of materials on private property. Upon request, the Contractor shall furnish the Engineer a copy of the property Owner’s permission.

All storage sites on private or airport property shall be restored to their original condition by the Contractor at his or her entire expense, except as otherwise agreed to (in writing) by the Owner or lessee of the property.

60-07 Unacceptable materials. Any material or assembly that does not conform to the requirements of the contract, plans, or specifications shall be considered unacceptable and shall be

rejected. The Contractor shall remove any rejected material or assembly from the site of the work, unless otherwise instructed by the Engineer.

Rejected material or assembly, the defects of which have been corrected by the Contractor, shall not be returned to the site of the work until such time as the Engineer has approved its use in the work.

60-08 Owner furnished materials. The Contractor shall furnish all materials required to complete the work, except those specified, if any, to be furnished by the Owner. Owner-furnished materials shall be made available to the Contractor at the location specified.

All costs of handling, transportation from the specified location to the site of work, storage, and installing Owner-furnished materials shall be included in the unit price bid for the contract item in which such Owner-furnished material is used.

After any Owner-furnished material has been delivered to the location specified, the Contractor shall be responsible for any demurrage, damage, loss, or other deficiencies that may occur during the Contractor's handling, storage, or use of such Owner-furnished material. The Owner will deduct from any monies due or to become due the Contractor any cost incurred by the Owner in making good such loss due to the Contractor's handling, storage, or use of Owner-furnished materials.

END OF SECTION 60

GENERAL PROVISIONS

Section 70 Legal Regulations and Responsibility to Public

70-01 Laws to be observed. The Contractor shall keep fully informed of all Federal and state laws, all local laws, ordinances, and regulations and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work, or which in any way affect the conduct of the work. The Contractor shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the Owner and all his or her officers, agents, or servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or the Contractor's employees.

70-02 Permits, licenses, and taxes. The Contractor shall procure all permits and licenses, pay all charges, fees, and taxes, and give all notices necessary and incidental to the due and lawful execution of the work.

70-03 Patented devices, materials, and processes. If the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, the Contractor shall provide for such use by suitable legal agreement with the Patentee or Owner. The Contractor and the surety shall indemnify and hold harmless the Owner, any third party, or political subdivision from any and all claims for infringement by reason of the use of any such patented design, device, material or process, or any trademark or copyright, and shall indemnify the Owner for any costs, expenses, and damages which it may be obliged to pay by reason of an infringement, at any time during the execution or after the completion of the work.

70-04 Restoration of surfaces disturbed by others. The Owner reserves the right to authorize the construction, reconstruction, or maintenance of any public or private utility service, FAA or National Oceanic and Atmospheric Administration (NOAA) facility, or a utility service of another government agency at any time during the progress of the work. To the extent that such construction, reconstruction, or maintenance has been coordinated with the Owner, such authorized work (by others) is indicated as follows: NONE.

Except as listed above, the Contractor shall not permit any individual, firm, or corporation to excavate or otherwise disturb such utility services or facilities located within the limits of the work without the written permission of the Engineer.

Should the Owner of public or private utility service, FAA, or NOAA facility, or a utility service of another government agency be authorized to construct, reconstruct, or maintain such utility service or facility during the progress of the work, the Contractor shall cooperate with such Owners by arranging and performing the work in this contract to facilitate such construction, reconstruction or maintenance by others whether or not such work by others is listed above. When ordered as extra work by the Engineer, the Contractor shall make all necessary repairs to the work which are due to such authorized work by others, unless otherwise provided for in the contract, plans, or specifications. It is understood and agreed that the Contractor shall not be entitled to make any claim for damages due to such authorized work by others or for any delay to the work resulting from such authorized work.

70-05 Federal aid participation. For Airport Improvement Program (AIP) contracts, the United States Government has agreed to reimburse the Owner for some portion of the contract costs. Such reimbursement is made from time to time upon the Owner's request to the FAA. In consideration of the United States Government's (FAA's) agreement with the Owner, the Owner has included

provisions in this contract pursuant to the requirements of Title 49 of the USC and the Rules and Regulations of the FAA that pertain to the work.

As required by the USC, the contract work is subject to the inspection and approval of duly authorized representatives of the FAA Administrator, and is further subject to those provisions of the rules and regulations that are cited in the contract, plans, or specifications.

No requirement of the USC, the rules and regulations implementing the USC, or this contract shall be construed as making the Federal Government a party to the contract nor will any such requirement interfere, in any way, with the rights of either party to the contract.

70-06 Sanitary, health, and safety provisions. The Contractor shall provide and maintain in a neat, sanitary condition such accommodations for the use of his or her employees as may be necessary to comply with the requirements of the state and local Board of Health, or of other bodies or tribunals having jurisdiction.

Attention is directed to Federal, state, and local laws, rules and regulations concerning construction safety and health standards. The Contractor shall not require any worker to work in surroundings or under conditions that are unsanitary, hazardous, or dangerous to his or her health or safety.

70-07 Public convenience and safety. The Contractor shall control his or her operations and those of his or her subcontractors and all suppliers, to assure the least inconvenience to the traveling public. Under all circumstances, safety shall be the most important consideration.

The Contractor shall maintain the free and unobstructed movement of aircraft and vehicular traffic with respect to his or her own operations and those of his or her subcontractors and all suppliers in accordance with the subsection 40-05 titled MAINTENANCE OF TRAFFIC of Section 40 hereinbefore specified and shall limit such operations for the convenience and safety of the traveling public as specified in the subsection 80-04 titled LIMITATION OF OPERATIONS of Section 80 hereinafter.

70-08 Barricades, warning signs, and hazard markings. The Contractor shall furnish, erect, and maintain all barricades, warning signs, and markings for hazards necessary to protect the public and the work. When used during periods of darkness, such barricades, warning signs, and hazard markings shall be suitably illuminated. Unless otherwise specified, barricades, warning signs, and markings for hazards that are in the air operations area (AOAs) shall be a maximum of 18 inches (0.5 m) high. Unless otherwise specified, barricades shall be spaced not more than 4 feet (1.2 m) apart. Barricades, warning signs, and markings shall be paid for under subsection 40-05.

For vehicular and pedestrian traffic, the Contractor shall furnish, erect, and maintain barricades, warning signs, lights and other traffic control devices in reasonable conformity with the Manual on Uniform Traffic Control Devices.

When the work requires closing an air operations area of the airport or portion of such area, the Contractor shall furnish, erect, and maintain temporary markings and associated lighting conforming to the requirements of advisory circular (AC) 150/5340-1, Standards for Airport Markings.

The Contractor shall furnish, erect, and maintain markings and associated lighting of open trenches, excavations, temporary stock piles, and the Contractor’s parked construction equipment that may be hazardous to the operation of emergency fire-rescue or maintenance vehicles on the airport in reasonable conformance to AC 150/5370-2, Operational Safety on Airports During Construction.

The Contractor shall identify each motorized vehicle or piece of construction equipment in reasonable conformance to AC 150/5370-2.

The Contractor shall furnish and erect all barricades, warning signs, and markings for hazards prior to commencing work that requires such erection and shall maintain the barricades, warning signs, and markings for hazards until their removal is directed by the Engineer.

Open-flame type lights shall not be permitted.

70-09 Use of explosives. When the use of explosives is necessary for the execution of the work, the Contractor shall exercise the utmost care not to endanger life or property, including new work. The Contractor shall be responsible for all damage resulting from the use of explosives.

All explosives shall be stored in a secure manner in compliance with all laws and ordinances, and all such storage places shall be clearly marked. Where no local laws or ordinances apply, storage shall be provided satisfactory to the Engineer and, in general, not closer than 1,000 feet (300 m) from the work or from any building, road, or other place of human occupancy.

The Contractor shall notify each property Owner and public utility company having structures or facilities in proximity to the site of the work of his or her intention to use explosives. Such notice shall be given sufficiently in advance to enable them to take such steps as they may deem necessary to protect their property from injury.

The use of electrical blasting caps shall not be permitted on or within 1,000 feet (300 m) of the airport property.

70-10 Protection and restoration of property and landscape. The Contractor shall be responsible for the preservation of all public and private property, and shall protect carefully from disturbance or damage all land monuments and property markers until the Engineer has witnessed or otherwise referenced their location and shall not move them until directed.

The Contractor shall be responsible for all damage or injury to property of any character, during the execution of the work, resulting from any act, omission, neglect, or misconduct in manner or method of executing the work, or at any time due to defective work or materials, and said responsibility shall not be released until the project has been completed and accepted.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work, or in consequence of the non-execution thereof by the Contractor, the Contractor shall restore, at his or her own expense, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, or otherwise restoring as may be directed, or the Contractor shall make good such damage or injury in an acceptable manner.

70-11 Responsibility for damage claims. The Contractor shall indemnify and save harmless the Engineer and the Owner and their officers, and employees from all suits, actions, or claims, of any character, brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the Contractor; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect, or misconduct of said Contractor; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims or amounts arising or recovered under the “Workmen’s Compensation Act,” or any other law, ordinance, order, or decree. Money due the Contractor under and by virtue of

his or her contract considered necessary by the Owner for such purpose may be retained for the use of the Owner or, in case no money is due, his or her surety may be held until such suits, actions, or claims for injuries or damages shall have been settled and suitable evidence to that effect furnished to the Owner, except that money due the Contractor will not be withheld when the Contractor produces satisfactory evidence that he or she is adequately protected by public liability and property damage insurance.

70-12 Third party beneficiary clause. It is specifically agreed between the parties executing the contract that it is not intended by any of the provisions of any part of the contract to create for the public or any member thereof, a third party beneficiary or to authorize anyone not a party to the contract to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of the contract.

70-13 Opening sections of the work to traffic. Should it be necessary for the Contractor to complete portions of the contract work for the beneficial occupancy of the Owner prior to completion of the entire contract, such “phasing” of the work shall be specified herein and indicated on the plans. When so specified, the Contractor shall complete such portions of the work on or before the date specified or as otherwise specified. The Contractor shall make his or her own estimate of the difficulties involved in arranging the work to permit such beneficial occupancy by the Owner as described below:

Per the phasing plan in the contract documents.

Upon completion of any portion of the work listed above, such portion shall be accepted by the Owner in accordance with the subsection 50-14 titled PARTIAL ACCEPTANCE of Section 50.

No portion of the work may be opened by the Contractor for public use until ordered by the Engineer in writing. Should it become necessary to open a portion of the work to public traffic on a temporary or intermittent basis, such openings shall be made when, in the opinion of the Engineer, such portion of the work is in an acceptable condition to support the intended traffic. Temporary or intermittent openings are considered to be inherent in the work and shall not constitute either acceptance of the portion of the work so opened or a waiver of any provision of the contract. Any damage to the portion of the work so opened that is not attributable to traffic which is permitted by the Owner shall be repaired by the Contractor at his or her expense.

The Contractor shall make his or her own estimate of the inherent difficulties involved in completing the work under the conditions herein described and shall not claim any added compensation by reason of delay or increased cost due to opening a portion of the contract work.

Contractor shall be required to conform to safety standards contained AC 150/5370-2 (see Special Provisions).

Contractor shall refer to the approved Construction Safety Phasing Plan (CSPP) to identify barricade requirements and other safety requirements prior to opening up sections of work to traffic.

70-14 Contractor’s responsibility for work. Until the Engineer’s final written acceptance of the entire completed work, excepting only those portions of the work accepted in accordance with the subsection 50-14 titled PARTIAL ACCEPTANCE of Section 50, the Contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part due to the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final

acceptance and shall bear the expense thereof except damage to the work due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to acts of God such as earthquake, tidal wave, tornado, hurricane or other cataclysmic phenomenon of nature, or acts of the public enemy or of government authorities.

If the work is suspended for any cause whatever, the Contractor shall be responsible for the work and shall take such precautions necessary to prevent damage to the work. The Contractor shall provide for normal drainage and shall erect necessary temporary structures, signs, or other facilities at his or her expense. During such period of suspension of work, the Contractor shall properly and continuously maintain in an acceptable growing condition all living material in newly established planting, seeding, and sodding furnished under the contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

70-15 Contractor's responsibility for utility service and facilities of others. As provided in the subsection 70-04 titled RESTORATION OF SURFACES DISTURBED BY OTHERS of this section, the Contractor shall cooperate with the Owner of any public or private utility service, FAA or NOAA, or a utility service of another government agency that may be authorized by the Owner to construct, reconstruct or maintain such utility services or facilities during the progress of the work. In addition, the Contractor shall control their operations to prevent the unscheduled interruption of such utility services and facilities.

To the extent that such public or private utility services, FAA, or NOAA facilities, or utility services of another governmental agency are known to exist within the limits of the contract work, the approximate locations have been indicated on the plans and the Owners are indicated as follows: NONE.

It is understood and agreed that the Owner does not guarantee the accuracy or the completeness of the location information relating to existing utility services, facilities, or structures that may be shown on the plans or encountered in the work. Any inaccuracy or omission in such information shall not relieve the Contractor of the responsibility to protect such existing features from damage or unscheduled interruption of service.

It is further understood and agreed that the Contractor shall, upon execution of the contract, notify the Owners of all utility services or other facilities of his or her plan of operations. Such notification shall be in writing addressed to THE PERSON TO CONTACT as provided in this subsection and subsection 70-04 titled RESTORATION OF SURFACES DISTURBED BY OTHERS of this section. A copy of each notification shall be given to the Engineer.

In addition to the general written notification provided, it shall be the responsibility of the Contractor to keep such individual Owners advised of changes in their plan of operations that would affect such Owners.

Prior to beginning the work in the general vicinity of an existing utility service or facility, the Contractor shall again notify each such Owner of their plan of operation. If, in the Contractor's opinion, the Owner's assistance is needed to locate the utility service or facility or the presence of a representative of the Owner is desirable to observe the work, such advice should be included in the notification. Such notification shall be given by the most expeditious means to reach the utility owner's PERSON TO CONTACT no later than two normal business days prior to the Contractor's commencement of operations in such general vicinity. The Contractor shall furnish a written summary of the notification to the Engineer.

The Contractor's failure to give the two days' notice shall be cause for the Owner to suspend the Contractor's operations in the general vicinity of a utility service or facility.

Where the outside limits of an underground utility service have been located and staked on the ground, the Contractor shall be required to use hand excavation methods within 3 feet (1 m) of such outside limits at such points as may be required to ensure protection from damage due to the Contractor's operations.

Should the Contractor damage or interrupt the operation of a utility service or facility by accident or otherwise, the Contractor shall immediately notify the proper authority and the Engineer and shall take all reasonable measures to prevent further damage or interruption of service. The Contractor, in such events, shall cooperate with the utility service or facility owner and the Engineer continuously until such damage has been repaired and service restored to the satisfaction of the utility or facility owner.

The Contractor shall bear all costs of damage and restoration of service to any utility service or facility due to their operations whether due to negligence or accident. The Owner reserves the right to deduct such costs from any monies due or which may become due the Contractor, or his or her surety.

70-15.1 FAA facilities and cable runs. NOT USED.

70-16 Furnishing rights-of-way. The Owner will be responsible for furnishing all rights-of-way upon which the work is to be constructed in advance of the Contractor's operations.

70-17 Personal liability of public officials. In carrying out any of the contract provisions or in exercising any power or authority granted by this contract, there shall be no liability upon the Engineer, his or her authorized representatives, or any officials of the Owner either personally or as an official of the Owner. It is understood that in such matters they act solely as agents and representatives of the Owner.

70-18 No waiver of legal rights. Upon completion of the work, the Owner will expeditiously make final inspection and notify the Contractor of final acceptance. Such final acceptance, however, shall not preclude or stop the Owner from correcting any measurement, estimate, or certificate made before or after completion of the work, nor shall the Owner be precluded or stopped from recovering from the Contractor or his or her surety, or both, such overpayment as may be sustained, or by failure on the part of the Contractor to fulfill his or her obligations under the contract. A waiver on the part of the Owner of any breach of any part of the contract shall not be held to be a waiver of any other or subsequent breach.

The Contractor, without prejudice to the terms of the contract, shall be liable to the Owner for latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the Owner's rights under any warranty or guaranty.

70-19 Environmental protection. The Contractor shall comply with all Federal, state, and local laws and regulations controlling pollution of the environment. The Contractor shall take necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, bitumens, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter.

70-20 Archaeological and historical findings. Unless otherwise specified in this subsection, the Contractor is advised that the site of the work is not within any property, district, or site, and does

not contain any building, structure, or object listed in the current National Register of Historic Places published by the United States Department of Interior.

Should the Contractor encounter, during his or her operations, any building, part of a building, structure, or object that is incongruous with its surroundings, the Contractor shall immediately cease operations in that location and notify the Engineer. The Engineer will immediately investigate the Contractor's finding and the Owner will direct the Contractor to either resume operations or to suspend operations as directed.

Should the Owner order suspension of the Contractor's operations in order to protect an archaeological or historical finding, or order the Contractor to perform extra work, such shall be covered by an appropriate contract change order or supplemental agreement as provided in the subsection 40-04 titled EXTRA WORK of Section 40 and the subsection 90-05 titled PAYMENT FOR EXTRA WORK of Section 90. If appropriate, the contract change order or supplemental agreement shall include an extension of contract time in accordance with the subsection 80-07 titled DETERMINATION AND EXTENSION OF CONTRACT TIME of Section 80.

END OF SECTION 70

GENERAL PROVISIONS

Section 80 Execution and Progress

80-01 Subletting of contract. The Owner will not recognize any subcontractor on the work. The Contractor shall at all times when work is in progress be represented either in person, by a qualified superintendent, or by other designated, qualified representative who is duly authorized to receive and execute orders of the Engineer.

The Contractor shall provide copies of all subcontracts to the Engineer. The Contractor shall perform, with his organization, an amount of work equal to at least 25% percent of the total contract cost.

Should the Contractor elect to assign his or her contract, said assignment shall be concurred in by the surety, shall be presented for the consideration and approval of the Owner, and shall be consummated only on the written approval of the Owner.

80-02 Notice to proceed. The notice to proceed shall state the date on which it is expected the Contractor will begin the construction and from which date contract time will be charged. The Contractor shall begin the work to be performed under the contract within 10 days of the date set by the Engineer in the written notice to proceed, but in any event, the Contractor shall notify the Engineer at least 24 hours in advance of the time actual construction operations will begin. The Contractor shall not commence any actual construction prior to the date on which the notice to proceed is issued by the Owner.

80-03 Execution and progress. Unless otherwise specified, the Contractor shall submit their progress schedule for the Engineer's approval within 10 days after the effective date of the notice to proceed. The Contractor's progress schedule, when approved by the Engineer, may be used to establish major construction operations and to check on the progress of the work. The Contractor shall provide sufficient materials, equipment, and labor to guarantee the completion of the project in accordance with the plans and specifications within the time set forth in the proposal.

If the Contractor falls significantly behind the submitted schedule, the Contractor shall, upon the Engineer's request, submit a revised schedule for completion of the work within the contract time and modify their operations to provide such additional materials, equipment, and labor necessary to meet the revised schedule. Should the execution of the work be discontinued for any reason, the Contractor shall notify the Engineer at least 24 hours in advance of resuming operations.

The Contractor shall not commence any actual construction prior to the date on which the notice to proceed is issued by the Owner.

80-04 Limitation of operations. The Contractor shall control his or her operations and the operations of his or her subcontractors and all suppliers to provide for the free and unobstructed movement of aircraft in the air operations areas (AOA) of the airport.

When the work requires the Contractor to conduct his or her operations within an AOA of the airport, the work shall be coordinated with airport operations (through the Engineer) at least 48 hours prior to commencement of such work. The Contractor shall not close an AOA until so authorized by the Engineer and until the necessary temporary marking and associated lighting is in place as provided in the subsection 70-08 titled BARRICADES, WARNING SIGNS, AND HAZARD MARKINGS of Section 70.

When the contract work requires the Contractor to work within an AOA of the airport on an intermittent basis (intermittent opening and closing of the AOA), the Contractor shall maintain constant communications as specified; immediately obey all instructions to vacate the AOA; immediately obey all instructions to resume work in such AOA. Failure to maintain the specified communications or to obey instructions shall be cause for suspension of the Contractor's operations in the AOA until the satisfactory conditions are provided. The following AOA cannot be closed to operating aircraft to permit the Contractor's operations on a continuous basis and will therefore be closed to aircraft operations intermittently as follows:

Per phasing plan in contract documents.

Contractor shall be required to conform to safety standards contained in AC 150/5370-2, Operational Safety on Airports During Construction (see Special Provisions).

80-04.1 Operational safety on airport during construction. All Contractors' operations shall be conducted in accordance with the project Construction Safety and Phasing Plan (CSPP) and the provisions set forth within the current version of AC 150/5370-2. The CSPP included within the contract documents conveys minimum requirements for operational safety on the airport during construction activities. The Contractor shall prepare and submit a Safety Plan Compliance Document that details how it proposes to comply with the requirements presented within the CSPP.

The Contractor shall implement all necessary safety plan measures prior to commencement of any work activity. The Contractor shall conduct routine checks to assure compliance with the safety plan measures.

The Contractor is responsible to the Owner for the conduct of all subcontractors it employs on the project. The Contractor shall assure that all subcontractors are made aware of the requirements of the CSPP and that they implement and maintain all necessary measures.

No deviation or modifications may be made to the approved CSPP unless approved in writing by the Owner or Engineer.

80-05 Character of workers, methods, and equipment. The Contractor shall, at all times, employ sufficient labor and equipment for prosecuting the work to full completion in the manner and time required by the contract, plans, and specifications.

All workers shall have sufficient skill and experience to perform properly the work assigned to them. Workers engaged in special work or skilled work shall have sufficient experience in such work and in the operation of the equipment required to perform the work satisfactorily.

Any person employed by the Contractor or by any subcontractor who violates any operational regulations or operational safety requirements and, in the opinion of the Engineer, does not perform his work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the Engineer, be removed forthwith by the Contractor or subcontractor employing such person, and shall not be employed again in any portion of the work without approval of the Engineer.

Should the Contractor fail to remove such persons or person, or fail to furnish suitable and sufficient personnel for the proper execution of the work, the Engineer may suspend the work by written notice until compliance with such orders.

All equipment that is proposed to be used on the work shall be of sufficient size and in such mechanical condition as to meet requirements of the work and to produce a satisfactory quality of

work. Equipment used on any portion of the work shall be such that no injury to previously completed work, adjacent property, or existing airport facilities will result from its use.

When the methods and equipment to be used by the Contractor in accomplishing the work are not prescribed in the contract, the Contractor is free to use any methods or equipment that will accomplish the work in conformity with the requirements of the contract, plans, and specifications.

When the contract specifies the use of certain methods and equipment, such methods and equipment shall be used unless others are authorized by the Engineer. If the Contractor desires to use a method or type of equipment other than specified in the contract, the Contractor may request authority from the Engineer to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed and of the reasons for desiring to make the change. If approval is given, it will be on the condition that the Contractor will be fully responsible for producing work in conformity with contract requirements. If, after trial use of the substituted methods or equipment, the Engineer determines that the work produced does not meet contract requirements, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining work with the specified methods and equipment. The Contractor shall remove any deficient work and replace it with work of specified quality, or take such other corrective action as the Engineer may direct. No change will be made in basis of payment for the contract items involved nor in contract time as a result of authorizing a change in methods or equipment under this subsection.

80-06 Temporary suspension of the work. The Owner shall have the authority to suspend the work wholly, or in part, for such period or periods as the Owner may deem necessary, due to unsuitable weather, or such other conditions as are considered unfavorable for the execution of the work, or for such time as is necessary due to the failure on the part of the Contractor to carry out orders given or perform any or all provisions of the contract.

In the event that the Contractor is ordered by the Owner, in writing, to suspend work for some unforeseen cause not otherwise provided for in the contract and over which the Contractor has no control, the Contractor may be reimbursed for actual money expended on the work during the period of shutdown. No allowance will be made for anticipated profits. The period of shutdown shall be computed from the effective date of the Engineer's order to suspend work to the effective date of the Engineer's order to resume the work. Claims for such compensation shall be filed with the Engineer within the time period stated in the Engineer's order to resume work. The Contractor shall submit with his or her claim information substantiating the amount shown on the claim. The Engineer will forward the Contractor's claim to the Owner for consideration in accordance with local laws or ordinances. No provision of this article shall be construed as entitling the Contractor to compensation for delays due to inclement weather, for suspensions made at the request of the Owner, or for any other delay provided for in the contract, plans, or specifications.

If it should become necessary to suspend work for an indefinite period, the Contractor shall store all materials in such manner that they will not become an obstruction nor become damaged in any way. The Contractor shall take every precaution to prevent damage or deterioration of the work performed and provide for normal drainage of the work. The Contractor shall erect temporary structures where necessary to provide for traffic on, to, or from the airport.

80-07 Determination and extension of contract time. The number of calendar or working days allowed for completion of the work shall be stated in the proposal and contract and shall be known as the CONTRACT TIME.

Should the contract time require extension for reasons beyond the Contractor's control, it shall be adjusted as follows:

a. CONTRACT TIME based on WORKING DAYS shall be calculated weekly by the Engineer. The Engineer will furnish the Contractor a copy of his or her weekly statement of the number of working days charged against the contract time during the week and the number of working days currently specified for completion of the contract (the original contract time plus the number of working days, if any, that have been included in approved CHANGE ORDERS or SUPPLEMENTAL AGREEMENTS covering EXTRA WORK).

The Engineer shall base his or her weekly statement of contract time charged on the following considerations:

1) No time shall be charged for days on which the Contractor is unable to proceed with the principal item of work under construction at the time for at least six (6) hours with the normal work force employed on such principal item. Should the normal work force be on a double-shift, 12 hours shall be used. Should the normal work force be on a triple-shift, 18 hours shall apply. Conditions beyond the Contractor's control such as strikes, lockouts, unusual delays in transportation, temporary suspension of the principal item of work under construction or temporary suspension of the entire work which have been ordered by the Owner for reasons not the fault of the Contractor, shall not be charged against the contract time.

2) The Engineer will not make charges against the contract time prior to the effective date of the notice to proceed.

3) The Engineer will begin charges against the contract time on the first working day after the effective date of the notice to proceed.

4) The Engineer will not make charges against the contract time after the date of final acceptance as defined in the subsection 50-15 titled FINAL ACCEPTANCE of Section 50.

5) The Contractor will be allowed one (1) week in which to file a written protest setting forth his or her objections to the Engineer's weekly statement. If no objection is filed within such specified time, the weekly statement shall be considered as acceptable to the Contractor.The contract time (stated in the proposal) is based on the originally estimated quantities as described in the subsection 20-05 titled INTERPRETATION OF ESTIMATED PROPOSAL QUANTITIES of Section 20. Should the satisfactory completion of the contract require performance of work in greater quantities than those estimated in the proposal, the contract time shall be increased in the same proportion as the cost of the actually completed quantities bears to the cost of the originally estimated quantities in the proposal. Such increase in contract time shall not consider either the cost of work or the extension of contract time that has been covered by change order or supplemental agreement and shall be made at the time of final payment.

b. Contract Time based on calendar days shall consist of the number of calendar days stated in the contract counting from the effective date of the notice to proceed and including all Saturdays, Sundays, holidays, and non-work days. All calendar days elapsing between the effective dates of the Owner's orders to suspend and resume all work, due to causes not the fault of the Contractor, shall be excluded.

At the time of final payment, the contract time shall be increased in the same proportion as the cost of the actually completed quantities bears to the cost of the originally estimated quantities in the proposal. Such increase in the contract time shall not consider either cost of work or the extension of contract time that has been covered by a change order or supplemental agreement. Charges against the contract time will cease as of the date of final acceptance.

c. When the contract time is a specified completion date, it shall be the date on which all contract work shall be substantially complete.

If the Contractor finds it impossible for reasons beyond his or her control to complete the work within the contract time as specified, or as extended in accordance with the provisions of this subsection, the Contractor may, at any time prior to the expiration of the contract time as extended, make a written request to the Owner for an extension of time setting forth the reasons which the Contractor believes will justify the granting of his or her request. Requests for extension of time on calendar day projects, caused by inclement weather, shall be supported with National Weather Bureau data showing the actual amount of inclement weather exceeded what could normally be expected during the contract period. The Contractor's plea that insufficient time was specified is not a valid reason for extension of time. If the supporting documentation justify the work was delayed because of conditions beyond the control and without the fault of the Contractor, the Owner may extend the time for completion by a change order that adjusts the contract time or completion date. The extended time for completion shall then be in full force and effect, the same as though it were the original time for completion.

80-08 Failure to complete on time. For each calendar day or working day, as specified in the contract, that any work remains uncompleted after the contract time (including all extensions and adjustments as provided in the subsection 80-07 titled DETERMINATION AND EXTENSION OF CONTRACT TIME of this Section) the sum specified in the contract and proposal as liquidated damages will be deducted from any money due or to become due the Contractor or his or her surety. Such deducted sums shall not be deducted as a penalty but shall be considered as liquidation of a reasonable portion of damages including but not limited to additional engineering services that will be incurred by the Owner should the Contractor fail to complete the work in the time provided in their contract.

The maximum construction time allowed for all work shall be 420 days to achieve substantial completion. Permitting the Contractor to continue and finish the work or any part of it after the time fixed for its completion, or after the date to which the time for completion may have been extended, will in no way operate as a wavier on the part of the Owner of any of its rights under the contract.

80-09 Default and termination of contract. The Contractor shall be considered in default of his or her contract and such default will be considered as cause for the Owner to terminate the contract for any of the following reasons if the Contractor:

a. Fails to begin the work under the contract within the time specified in the Notice to Proceed, or

b. Fails to perform the work or fails to provide sufficient workers, equipment and/or materials to assure completion of work in accordance with the terms of the contract, or

c. Performs the work unsuitably or neglects or refuses to remove materials or to perform anew such work as may be rejected as unacceptable and unsuitable, or

d. Discontinues the execution of the work, or

e. Fails to resume work which has been discontinued within a reasonable time after notice to do so, or

f. Becomes insolvent or is declared bankrupt, or commits any act of bankruptcy or insolvency, or

g. Allows any final judgment to stand against the Contractor unsatisfied for a period of 10 days, or

h. Makes an assignment for the benefit of creditors, or

i. For any other cause whatsoever, fails to carry on the work in an acceptable manner.

Should the Engineer consider the Contractor in default of the contract for any reason above, the Engineer shall immediately give written notice to the Contractor and the Contractor's surety as to the reasons for considering the Contractor in default and the Owner's intentions to terminate the contract.

If the Contractor or surety, within a period of 10 days after such notice, does not proceed in accordance therewith, then the Owner will, upon written notification from the Engineer of the facts of such delay, neglect, or default and the Contractor's failure to comply with such notice, have full power and authority without violating the contract, to take the execution of the work out of the hands of the Contractor. The Owner may appropriate or use any or all materials and equipment that have been mobilized for use in the work and are acceptable and may enter into an agreement for the completion of said contract according to the terms and provisions thereof, or use such other methods as in the opinion of the Engineer will be required for the completion of said contract in an acceptable manner.

All costs and charges incurred by the Owner, together with the cost of completing the work under contract, will be deducted from any monies due or which may become due the Contractor. If such expense exceeds the sum which would have been payable under the contract, then the Contractor and the surety shall be liable and shall pay to the Owner the amount of such excess.

80-10 Termination for national emergencies. The Owner shall terminate the contract or portion thereof by written notice when the Contractor is prevented from proceeding with the construction contract as a direct result of an Executive Order of the President with respect to the execution of war or in the interest of national defense.

When the contract, or any portion thereof, is terminated before completion of all items of work in the contract, payment will be made for the actual number of units or items of work completed at the contract price or as mutually agreed for items of work partially completed or not started. No claims or loss of anticipated profits shall be considered.

Reimbursement for organization of the work, and other overhead expenses, (when not otherwise included in the contract) and moving equipment and materials to and from the job will be considered, the intent being that an equitable settlement will be made with the Contractor.

Acceptable materials, obtained or ordered by the Contractor for the work and that are not incorporated in the work shall, at the option of the Contractor, be purchased from the Contractor at

actual cost as shown by receipted bills and actual cost records at such points of delivery as may be designated by the Engineer.

Termination of the contract or a portion thereof shall neither relieve the Contractor of his or her responsibilities for the completed work nor shall it relieve his or her surety of its obligation for and concerning any just claim arising out of the work performed.

80-11 Work area, storage area and sequence of operations. The Contractor shall obtain approval from the Engineer prior to beginning any work in all areas of the airport. No operating runway, taxiway, or air operations area (AOA) shall be crossed, entered, or obstructed while it is operational. The Contractor shall plan and coordinate his or her work in such a manner as to ensure safety and a minimum of hindrance to flight operations. All Contractor equipment and material stockpiles shall be stored a minimum or **1000** feet from the centerline of an active runway. No equipment will be allowed to park within the approach area of an active runway at any time. No equipment shall be within **1000** feet of an active runway at any time.

END OF SECTION 80

GENERAL PROVISIONS

Section 90 Measurement and Payment

90-01 Measurement of quantities. All work completed under the contract will be measured by the Engineer, or his or her authorized representatives, using United States Customary Units of Measurement or the International System of Units.

The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the contract will be those methods generally recognized as conforming to good engineering practice.

Unless otherwise specified, longitudinal measurements for area computations will be made horizontally, and no deductions will be made for individual fixtures (or leave-outs) having an area of 9 square feet (0.8 square meters) or less. Unless otherwise specified, transverse measurements for area computations will be the neat dimensions shown on the plans or ordered in writing by the Engineer.

Structures will be measured according to neat lines shown on the plans or as altered to fit field conditions.

Unless otherwise specified, all contract items which are measured by the linear foot such as electrical ducts, conduits, pipe culverts, underdrains, and similar items shall be measured parallel to the base or foundation upon which such items are placed.

In computing volumes of excavation the average end area method or other acceptable methods will be used.

The thickness of plates and galvanized sheet used in the manufacture of corrugated metal pipe, metal plate pipe culverts and arches, and metal cribbing will be specified and measured in decimal fraction of inch.

The term “ton” will mean the short ton consisting of 2,000 lb (907 km) avoirdupois. All materials that are measured or proportioned by weights shall be weighed on accurate, approved scales by competent, qualified personnel at locations designed by the Engineer. If material is shipped by rail, the car weight may be accepted provided that only the actual weight of material is paid for. However, car weights will not be acceptable for material to be passed through mixing plants. Trucks used to haul material being paid for by weight shall be weighed empty daily at such times as the Engineer directs, and each truck shall bear a plainly legible identification mark.

Materials to be measured by volume in the hauling vehicle shall be hauled in approved vehicles and measured therein at the point of delivery. Vehicles for this purpose may be of any size or type acceptable for the materials hauled, provided that the body is of such shape that the actual contents may be readily and accurately determined. All vehicles shall be loaded to at least their water level capacity, and all loads shall be leveled when the vehicles arrive at the point of delivery.

When requested by the Contractor and approved by the Engineer in writing, material specified to be measured by the cubic yard (cubic meter) may be weighed, and such weights will be converted to cubic yards (cubic meters) for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the Engineer and shall be agreed to by the Contractor before such method of measurement of pay quantities is used.

Bituminous materials will be measured by the gallon (liter) or ton (kg). When measured by volume, such volumes will be measured at 60°F (16°C) or will be corrected to the volume at 60°F (16°C) using ASTM D1250 for asphalts or ASTM D633 for tars.

Net certified scale weights or weights based on certified volumes in the case of rail shipments will be used as a basis of measurement, subject to correction when bituminous material has been lost from the car or the distributor, wasted, or otherwise not incorporated in the work.

When bituminous materials are shipped by truck or transport, net certified weights by volume, subject to correction for loss or foaming, may be used for computing quantities.

Cement will be measured by the ton (kg) or hundredweight (km).

Timber will be measured by the thousand feet board measure (MFBM) actually incorporated in the structure. Measurement will be based on nominal widths and thicknesses and the extreme length of each piece.

The term “lump sum” when used as an item of payment will mean complete payment for the work described in the contract.

When a complete structure or structural unit (in effect, “lump sum” work) is specified as the unit of measurement, the unit will be construed to include all necessary fittings and accessories.

Rental of equipment will be measured by time in hours of actual working time and necessary traveling time of the equipment within the limits of the work. Special equipment ordered by the Engineer in connection with force account work will be measured as agreed in the change order or supplemental agreement authorizing such force account work as provided in the subsection 90-05 titled PAYMENT FOR EXTRA WORK of this section.

When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by gauge, unit weight, section dimensions, etc., such identification will be considered to be nominal weights or dimensions. Unless more stringently controlled by tolerances in cited specifications, manufacturing tolerances established by the industries involved will be accepted.

Scales for weighing materials which are required to be proportioned or measured and paid for by weight shall be furnished, erected, and maintained by the Contractor, or be certified permanently installed commercial scales.

Scales shall be accurate within 1/2% of the correct weight throughout the range of use. The Contractor shall have the scales checked under the observation of the inspector before beginning work and at such other times as requested. The intervals shall be uniform in spacing throughout the graduated or marked length of the beam or dial and shall not exceed one-tenth of 1% of the nominal rated capacity of the scale, but not less than 1 pound (454 grams). The use of spring balances will not be permitted.

Beams, dials, platforms, and other scale equipment shall be so arranged that the operator and the inspector can safely and conveniently view them.

Scale installations shall have available ten standard 50-pound (2.3 km) weights for testing the weighing equipment or suitable weights and devices for other approved equipment.

Scales must be tested for accuracy and serviced before use at a new site. Platform scales shall be installed and maintained with the platform level and rigid bulkheads at each end.

Scales “overweighing” (indicating more than correct weight) will not be permitted to operate, and all materials received subsequent to the last previous correct weighting-accuracy test will be reduced by the percentage of error in excess of one-half of 1%.

In the event inspection reveals the scales have been underweighing (indicating less than correct weight), they shall be adjusted, and no additional payment to the Contractor will be allowed for materials previously weighed and recorded.

All costs in connection with furnishing, installing, certifying, testing, and maintaining scales; for furnishing check weights and scale house; and for all other items specified in this subsection, for the weighing of materials for proportioning or payment, shall be included in the unit contract prices for the various items of the project.

When the estimated quantities for a specific portion of the work are designated as the pay quantities in the contract, they shall be the final quantities for which payment for such specific portion of the work will be made, unless the dimensions of said portions of the work shown on the plans are revised by the Engineer. If revised dimensions result in an increase or decrease in the quantities of such work, the final quantities for payment will be revised in the amount represented by the authorized changes in the dimensions.

90-02 Scope of payment. The Contractor shall receive and accept compensation provided for in the contract as full payment for furnishing all materials, for performing all work under the contract in a complete and acceptable manner, and for all risk, loss, damage, or expense of whatever character arising out of the nature of the work or the execution thereof, subject to the provisions of the subsection 70-18 titled NO WAIVER OF LEGAL RIGHTS of Section 70.

When the “basis of payment” subsection of a technical specification requires that the contract price (price bid) include compensation for certain work or material essential to the item, this same work or material will not also be measured for payment under any other contract item which may appear elsewhere in the contract, plans, or specifications.

90-03 Compensation for altered quantities. When the accepted quantities of work vary from the quantities in the proposal, the Contractor shall accept as payment in full, so far as contract items are concerned, payment at the original contract price for the accepted quantities of work actually completed and accepted. No allowance, except as provided for in the subsection 40-02 titled ALTERATION OF WORK AND QUANTITIES of Section 40 will be made for any increased expense, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor which results directly from such alterations or indirectly from his or her unbalanced allocation of overhead and profit among the contract items, or from any other cause.

90-04 Payment for omitted items. As specified in the subsection 40-03 titled OMITTED ITEMS of Section 40, the Engineer shall have the right to omit from the work (order nonperformance) any contract item, except major contract items, in the best interest of the Owner.

Should the Engineer omit or order nonperformance of a contract item or portion of such item from the work, the Contractor shall accept payment in full at the contract prices for any work actually completed and acceptable prior to the Engineer’s order to omit or non-perform such contract item.

Acceptable materials ordered by the Contractor or delivered on the work prior to the date of the Engineer's order will be paid for at the actual cost to the Contractor and shall thereupon become the property of the Owner.

In addition to the reimbursement hereinbefore provided, the Contractor shall be reimbursed for all actual costs incurred for the purpose of performing the omitted contract item prior to the date of the Engineer's order. Such additional costs incurred by the Contractor must be directly related to the deleted contract item and shall be supported by certified statements by the Contractor as to the nature the amount of such costs.

90-05 Payment for extra work. Extra work, performed in accordance with the subsection 40-04 titled EXTRA WORK of Section 40, will be paid for at the contract prices or agreed prices specified in the change order or supplemental agreement authorizing the extra work.

90-06 Partial payments. Partial payments will be made to the Contractor at least once each month as the work progresses. Said payments will be based upon estimates, prepared by the Engineer, of the value of the work performed and materials complete and in place, in accordance with the contract, plans, and specifications. Such partial payments may also include the delivered actual cost of those materials stockpiled and stored in accordance with the subsection 90-07 titled PAYMENT FOR MATERIALS ON HAND of this section. No partial payment will be made when the amount due to the Contractor since the last estimate amounts to less than five hundred dollars.

The Contractor is required to pay all subcontractors for satisfactory performance of their contracts no later than 30 days after the Contractor has received a partial payment. The Owner must ensure prompt and full payment of retainage from the prime Contractor to the subcontractor within 30 days after the subcontractor's work is satisfactorily completed. A subcontractor's work is satisfactorily completed when all the tasks called for in the subcontract have been accomplished and documented as required by the Owner. When the Owner has made an incremental acceptance of a portion of a prime contract, the work of a subcontractor covered by that acceptance is deemed to be satisfactorily completed.

From the total of the amount determined to be payable on a partial payment, 10% percent of such total amount will be deducted and retained by the Owner until the final payment is made, except as may be provided (at the Contractor's option) in the subsection 90-08 titled PAYMENT OF WITHHELD FUNDS of this section. The balance of the amount payable, less all previous payments, shall be certified for payment. Should the Contractor exercise his or her option, as provided in the subsection 90-08 titled PAYMENT OF WITHHELD FUNDS of this section, no such percent retainage shall be deducted.

When at least 95% of the work has been completed, the Engineer shall, at the Owner's discretion and with the consent of the surety, prepare estimates of both the contract value and the cost of the remaining work to be done.

The Owner may retain an amount not less than twice the contract value or estimated cost, whichever is greater, of the work remaining to be done. The remainder, less all previous payments and deductions, will then be certified for payment to the Contractor.

It is understood and agreed that the Contractor shall not be entitled to demand or receive partial payment based on quantities of work in excess of those provided in the proposal or covered by approved change orders or supplemental agreements, except when such excess quantities have been determined by the Engineer to be a part of the final quantity for the item of work in question.

No partial payment shall bind the Owner to the acceptance of any materials or work in place as to quality or quantity. All partial payments are subject to correction at the time of final payment as provided in the subsection 90-09 titled ACCEPTANCE AND FINAL PAYMENT of this section.

The Contractor shall deliver to the Owner a complete release of all claims for labor and material arising out of this contract before the final payment is made. If any subcontractor or supplier fails to furnish such a release in full, the Contractor may furnish a bond or other collateral satisfactory to the Owner to indemnify the Owner against any potential lien or other such claim. The bond or collateral shall include all costs, expenses, and attorney fees the Owner may be compelled to pay in discharging any such lien or claim.

90-07 Payment for materials on hand. Partial payments may be made to the extent of the delivered cost of materials to be incorporated in the work, provided that such materials meet the requirements of the contract, plans, and specifications and are delivered to acceptable sites on the airport property or at other sites in the vicinity that are acceptable to the Owner. Such delivered costs of stored or stockpiled materials may be included in the next partial payment after the following conditions are met:

a. The material has been stored or stockpiled in a manner acceptable to the Engineer at or on an approved site.

b. The Contractor has furnished the Engineer with acceptable evidence of the quantity and quality of such stored or stockpiled materials.

c. The Contractor has furnished the Engineer with satisfactory evidence that the material and transportation costs have been paid.

d. The Contractor has furnished the Owner legal title (free of liens or encumbrances of any kind) to the material so stored or stockpiled.

e. The Contractor has furnished the Owner evidence that the material so stored or stockpiled is insured against loss by damage to or disappearance of such materials at any time prior to use in the work.

It is understood and agreed that the transfer of title and the Owner's payment for such stored or stockpiled materials shall in no way relieve the Contractor of his or her responsibility for furnishing and placing such materials in accordance with the requirements of the contract, plans, and specifications.

In no case will the amount of partial payments for materials on hand exceed the contract price for such materials or the contract price for the contract item in which the material is intended to be used.

No partial payment will be made for stored or stockpiled living or perishable plant materials.

The Contractor shall bear all costs associated with the partial payment of stored or stockpiled materials in accordance with the provisions of this subsection.

90-08 Payment of withheld funds. At the Contractor's option, if an Owner withholds retainage in accordance with the methods described in subsection 90-06 PARTIAL PAYMENTS, the Contractor may request that the Owner deposit the retainage into an escrow account. The Owner's deposit of retainage into an escrow account is subject to the following conditions

a. The Contractor shall bear all expenses of establishing and maintaining an escrow account and escrow agreement acceptable to the Owner.

b. The Contractor shall deposit to and maintain in such escrow only those securities or bank certificates of deposit as are acceptable to the Owner and having a value not less than the retainage that would otherwise be withheld from partial payment.

c. The Contractor shall enter into an escrow agreement satisfactory to the Owner.

d. The Contractor shall obtain the written consent of the surety to such agreement.

90-09 Acceptance and final payment. When the contract work has been accepted in accordance with the requirements of the subsection 50-15 titled FINAL ACCEPTANCE of Section 50, the Engineer will prepare the final estimate of the items of work actually performed. The Contractor shall approve the Engineer's final estimate or advise the Engineer of the Contractor's objections to the final estimate which are based on disputes in measurements or computations of the final quantities to be paid under the contract as amended by change order or supplemental agreement. The Contractor and the Engineer shall resolve all disputes (if any) in the measurement and computation of final quantities to be paid within 30 calendar days of the Contractor's receipt of the Engineer's final estimate. If, after such 30-day period, a dispute still exists, the Contractor may approve the Engineer's estimate under protest of the quantities in dispute, and such disputed quantities shall be considered by the Owner as a claim in accordance with the subsection 50-16 titled CLAIMS FOR ADJUSTMENT AND DISPUTES of Section 50.

After the Contractor has approved, or approved under protest, the Engineer's final estimate, and after the Engineer's receipt of the project closeout documentation required in subsection 90-11 Project Closeout, final payment will be processed based on the entire sum, or the undisputed sum in case of approval under protest, determined to be due the Contractor less all previous payments and all amounts to be deducted under the provisions of the contract. All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

If the Contractor has filed a claim for additional compensation under the provisions of the subsection 50-16 titled CLAIMS FOR ADJUSTMENTS AND DISPUTES of Section 50 or under the provisions of this subsection, such claims will be considered by the Owner in accordance with local laws or ordinances. Upon final adjudication of such claims, any additional payment determined to be due the Contractor will be paid pursuant to a supplemental final estimate.

90-10 Construction warranty.

a. In addition to any other warranties in this contract, the Contractor warrants that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, workmanship, or design furnished, or performed by the Contractor or any subcontractor or supplier at any tier.

b. This warranty shall continue for a period of one year from the date of final acceptance of the work. If the Owner takes possession of any part of the work before final acceptance, this warranty shall continue for a period of one year from the date the Owner takes possession. However, this will not relieve the Contractor from corrective items required by the final acceptance of the project work.

c. The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Owner real or personal property, when that damage is the result of:

1) The Contractor's failure to conform to contract requirements; or

2) Any defect of equipment, material, workmanship, or design furnished by the Contractor.

d. The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for one year from the date of repair or replacement.

e. The Owner will notify the Contractor, in writing, within seven (7) days after the discovery of any failure, defect, or damage.

f. If the Contractor fails to remedy any failure, defect, or damage within 14 days after receipt of notice, the Owner shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.

g. With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall: (1) Obtain all warranties that would be given in normal commercial practice; (2) Require all warranties to be executed, in writing, for the benefit of the Owner, as directed by the Owner, and (3) Enforce all warranties for the benefit of the Owner.

h. This warranty shall not limit the Owner's rights with respect to latent defects, gross mistakes, or fraud.

90-11 Project closeout. Approval of final payment to the Contractor is contingent upon completion and submittal of the items listed below. The final payment will not be approved until the Engineer approves the Contractor's final submittal. The Contractor shall:

a. Provide two (2) copies of all manufacturers warranties specified for materials, equipment, and installations.

b. Provide weekly payroll records (not previously received) from the general Contractor and all subcontractors.

c. Complete final cleanup in accordance with subsection 40-08, FINAL CLEANUP.

d. Complete all punch list items identified during the Final Inspection.

e. Provide complete release of all claims for labor and material arising out of the Contract.

f. Provide a certified statement signed by the subcontractors, indicating actual amounts paid to the Disadvantaged Business Enterprise (DBE) subcontractors and/or suppliers associated with the project.

g. When applicable per state requirements, return copies of sales tax completion forms.

h. Manufacturer's certifications for all items incorporated in the work.

i. All required record drawings, as-built drawings or as-constructed drawings.

j. Project Operation and Maintenance (O&M) Manual.

k. Security for Construction Warranty.

l. Equipment commissioning documentation submitted, if required.

END OF SECTION 90

GENERAL PROVISIONS

Section 100 Contractor Quality Control Program

100-01 General. When the specification requires a Contractor Quality Control Program, the Contractor shall establish, provide, and maintain an effective Quality Control Program that details the methods and procedures that will be taken to assure that all materials and completed construction required by this contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors. Although guidelines are established and certain minimum requirements are specified here and elsewhere in the contract technical specifications, the Contractor shall assume full responsibility for accomplishing the stated purpose.

The intent of this section is to enable the Contractor to establish a necessary level of control that will:

a. Adequately provide for the production of acceptable quality materials.

b. Provide sufficient information to assure both the Contractor and the Engineer that the specification requirements can be met.

c. Allow the Contractor as much latitude as possible to develop his or her own standard of control.

The Contractor shall be prepared to discuss and present, at the preconstruction conference, their understanding of the quality control requirements. The Contractor shall not begin any construction or production of materials to be incorporated into the completed work until the Quality Control Program has been reviewed and accepted by the Engineer. No partial payment will be made for materials subject to specific quality control requirements until the Quality Control Program has been reviewed.

The quality control requirements contained in this section and elsewhere in the contract technical specifications are in addition to and separate from the acceptance testing requirements. Acceptance testing requirements are the responsibility of the Engineer.

Paving projects over $500,000 shall have a Quality Control (QC)/Quality Assurance (QA) workshop with the Engineer, Contractor, subcontractors, testing laboratories, and Owner's representative at start of construction. The workshop shall address QC and QA requirements of the project specifications. The Contractor shall coordinate with the Airport and the Engineer on time and location of the QC/QA workshop.

100-02 Description of program.

a. General description. The Contractor shall establish a Quality Control Program to perform quality control inspection and testing of all items of work required by the technical specifications, including those performed by subcontractors. This Quality Control Program shall ensure conformance to applicable specifications and plans with respect to materials, workmanship, construction, finish, and functional performance. The Quality Control Program shall be effective for control of all construction work performed under this Contract and shall specifically include surveillance and tests required by the technical specifications, in addition to other requirements of this section and any other activities deemed necessary by the Contractor to establish an effective level of quality control.

b. Quality Control Program. The Contractor shall describe the Quality Control Program in a written document that shall be reviewed and approved by the Engineer prior to the start of any production, construction, or off-site fabrication. The written Quality Control Program shall be submitted to the Engineer for review and approval at least 5 calendar days before the Pre-Construction Conference. The Contractor's Quality Control Plan and Quality Control testing laboratory must be approved in writing by the Engineer prior to the Notice to Proceed (NTP).

The Quality Control Program shall be organized to address, as a minimum, the following items:

a. Quality control organization

b. Project progress schedule

c. Submittals schedule

d. Inspection requirements

e. Quality control testing plan

f. Documentation of quality control activities

g. Requirements for corrective action when quality control and/or acceptance criteria are not met

The Contractor is encouraged to add any additional elements to the Quality Control Program that is deemed necessary to adequately control all production and/or construction processes required by this contract.

100-03 Quality control organization. The Contractor Quality Control Program shall be implemented by the establishment of a separate quality control organization. An organizational chart shall be developed to show all quality control personnel and how these personnel integrate with other management/production and construction functions and personnel.

The organizational chart shall identify all quality control staff by name and function, and shall indicate the total staff required to implement all elements of the Quality Control Program, including inspection and testing for each item of work. If necessary, different technicians can be used for specific inspection and testing functions for different items of work. If an outside organization or independent testing laboratory is used for implementation of all or part of the Quality Control Program, the personnel assigned shall be subject to the qualification requirements of paragraph 100-03a and 100-03b. The organizational chart shall indicate which personnel are Contractor employees and which are provided by an outside organization.

The quality control organization shall, as a minimum, consist of the following personnel:

a. Program Administrator. The Program Administrator shall be a full-time on-site employee of the Contractor, or a consultant engaged by the Contractor. The Program Administrator shall have a minimum of five (5) years of experience in airport and/or highway construction and shall have had prior quality control experience on a project of comparable size and scope as the contract.

Additional qualifications for the Program Administrator shall include at least one of the following requirements:

1) Professional Engineer with one (1) year of airport paving experience.

2) Engineer-in-training with two (2) years of airport paving experience.

3) An individual with three (3) years of highway and/or airport paving experience, with a Bachelor of Science Degree in Civil Engineering, Civil Engineering Technology or Construction.

4) Construction materials technician certified at Level III by the National Institute for Certification in Engineering Technologies (NICET).

5) Highway materials technician certified at Level III by NICET.

6) Highway construction technician certified at Level III by NICET.

7) A NICET certified engineering technician in Civil Engineering Technology with five (5) years of highway and/or airport paving experience.

The Program Administrator shall have full authority to institute any and all actions necessary for the successful implementation of the Quality Control Program to ensure compliance with the contract plans and technical specifications. The Program Administrator shall report directly to a responsible officer of the construction firm. The Program Administrator may supervise the Quality Control Program on more than one project provided that person can be at the job site within two (2) hours after being notified of a problem.

b. Quality control technicians. A sufficient number of quality control technicians necessary to adequately implement the Quality Control Program shall be provided. These personnel shall be either Engineers, engineering technicians, or experienced craftsman with qualifications in the appropriate field equivalent to NICET Level II or higher construction materials technician or highway construction technician and shall have a minimum of two (2) years of experience in their area of expertise.

The quality control technicians shall report directly to the Program Administrator and shall perform the following functions:

1) Inspection of all materials, construction, plant, and equipment for conformance to the technical specifications, and as required by subsection 100-06.

2) Performance of all quality control tests as required by the technical specifications and subsection 100-07.

3) Performance of density tests for the Engineer when required by the technical specifications.

Certification at an equivalent level, by a state or nationally recognized organization will be acceptable in lieu of NICET certification.

c. Staffing levels. The Contractor shall provide sufficient qualified quality control personnel to monitor each work activity at all times. Where material is being produced in a plant for

incorporation into the work, separate plant and field technicians shall be provided at each plant and field placement location. The scheduling and coordinating of all inspection and testing must match the type and pace of work activity. The Quality Control Program shall state where different technicians will be required for different work elements.

100-04 Project progress schedule. The Contractor shall submit a coordinated construction schedule for all work activities. The schedule shall be prepared as a network diagram in Critical Path Method (CPM), Program Evaluation and Review Technique (PERT), or other format, or as otherwise specified in the contract. As a minimum, it shall provide information on the sequence of work activities, milestone dates, and activity duration.

The Contractor shall maintain the work schedule and provide an update and analysis of the progress schedule on a twice monthly basis, or as otherwise specified in the contract. Submission of the work schedule shall not relieve the Contractor of overall responsibility for scheduling, sequencing, and coordinating all work to comply with the requirements of the contract.

100-05 Submittals schedule. The Contractor shall submit a detailed listing of all submittals (for example, mix designs, material certifications) and shop drawings required by the technical specifications. The listing can be developed in a spreadsheet format and shall include:

a. Specification item number

b. Item description

c. Description of submittal

d. Specification paragraph requiring submittal

e. Scheduled date of submittal

100-06 Inspection requirements. Quality control inspection functions shall be organized to provide inspections for all definable features of work, as detailed below. All inspections shall be documented by the Contractor as specified by subsection 100-07.

Inspections shall be performed daily to ensure continuing compliance with contract requirements until completion of the particular feature of work. These shall include the following minimum requirements:

a. During plant operation for material production, quality control test results and periodic inspections shall be used to ensure the quality of aggregates and other mix components, and to adjust and control mix proportioning to meet the approved mix design and other requirements of the technical specifications. All equipment used in proportioning and mixing shall be inspected to ensure its proper operating condition. The Quality Control Program shall detail how these and other quality control functions will be accomplished and used.

b. During field operations, quality control test results and periodic inspections shall be used to ensure the quality of all materials and workmanship. All equipment used in placing, finishing, and compacting shall be inspected to ensure its proper operating condition and to ensure that all such operations are in conformance to the technical specifications and are within the plan dimensions, lines, grades, and tolerances specified. The Program shall document how these and other quality control functions will be accomplished and used.

100-07 Quality control testing plan. As a part of the overall Quality Control Program, the Contractor shall implement a quality control testing plan, as required by the technical specifications. The testing plan shall include the minimum tests and test frequencies required by each technical specification Item, as well as any additional quality control tests that the Contractor deems necessary to adequately control production and/or construction processes.

The testing plan can be developed in a spreadsheet fashion and shall, as a minimum, include the following:

a. Specification item number (for example, P-401)

b. Item description (for example, Plant Mix Bituminous Pavements)

c. Test type (for example, gradation, grade, asphalt content)

d. Test standard (for example, ASTM or American Association of State Highway and Transportation Officials (AASHTO) test number, as applicable)

e. Test frequency (for example, as required by technical specifications or minimum frequency when requirements are not stated)

f. Responsibility (for example, plant technician)

g. Control requirements (for example, target, permissible deviations)

The testing plan shall contain a statistically-based procedure of random sampling for acquiring test samples in accordance with ASTM D3665. The Engineer shall be provided the opportunity to witness quality control sampling and testing.

All quality control test results shall be documented by the Contractor as required by subsection 100-08.

100-08 Documentation. The Contractor shall maintain current quality control records of all inspections and tests performed. These records shall include factual evidence that the required inspections or tests have been performed, including type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, causes for rejection, etc.; proposed remedial action; and corrective actions taken.

These records must cover both conforming and defective or deficient features, and must include a statement that all supplies and materials incorporated in the work are in full compliance with the terms of the contract. Legible copies of these records shall be furnished to the Engineer daily. The records shall cover all work placed subsequent to the previously furnished records and shall be verified and signed by the Contractor's Program Administrator.

Specific Contractor quality control records required for the contract shall include, but are not necessarily limited to, the following records:

a. Daily inspection reports. Each Contractor quality control technician shall maintain a daily log of all inspections performed for both Contractor and subcontractor operations. These technician's daily reports shall provide factual evidence that continuous quality control inspections have been performed and shall, as a minimum, include the following:

1) Technical specification item number and description

2) Compliance with approved submittals

3) Proper storage of materials and equipment

4) Proper operation of all equipment

5) Adherence to plans and technical specifications

6) Review of quality control tests

7) Safety inspection.

The daily inspection reports shall identify inspections conducted, results of inspections, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed.

The daily inspection reports shall be signed by the responsible quality control technician and the Program Administrator. The Engineer shall be provided at least one copy of each daily inspection report on the work day following the day of record.

b. Daily test reports. The Contractor shall be responsible for establishing a system that will record all quality control test results. Daily test reports shall document the following information:

1) Technical specification item number and description

2) Test designation

3) Location

4) Date of test

5) Control requirements

6) Test results

7) Causes for rejection

8) Recommended remedial actions

9) Retests

Test results from each day's work period shall be submitted to the Engineer prior to the start of the next day's work period. When required by the technical specifications, the Contractor shall maintain statistical quality control charts. The daily test reports shall be signed by the responsible quality control technician and the Program Administrator.

100-09 Corrective action requirements. The Quality Control Program shall indicate the appropriate action to be taken when a process is deemed, or believed, to be out of control (out of tolerance) and detail what action will be taken to bring the process into control. The requirements

for corrective action shall include both general requirements for operation of the Quality Control Program as a whole, and for individual items of work contained in the technical specifications.

The Quality Control Program shall detail how the results of quality control inspections and tests will be used for determining the need for corrective action and shall contain clear sets of rules to gauge when a process is out of control and the type of correction to be taken to regain process control.

When applicable or required by the technical specifications, the Contractor shall establish and use statistical quality control charts for individual quality control tests. The requirements for corrective action shall be linked to the control charts.

100-10 Surveillance by the Engineer. All items of material and equipment shall be subject to surveillance by the Engineer at the point of production, manufacture or shipment to determine if the Contractor, producer, manufacturer or shipper maintains an adequate quality control system in conformance with the requirements detailed here and the applicable technical specifications and plans. In addition, all items of materials, equipment and work in place shall be subject to surveillance by the Engineer at the site for the same purpose.

Surveillance by the Engineer does not relieve the Contractor of performing quality control inspections of either on-site or off-site Contractor's or subcontractor's work.

100-11 Noncompliance.

a. The Engineer will notify the Contractor of any noncompliance with any of the foregoing requirements. The Contractor shall, after receipt of such notice, immediately take corrective action. Any notice, when delivered by the Engineer or his or her authorized representative to the Contractor or his or her authorized representative at the site of the work, shall be considered sufficient notice.

b. In cases where quality control activities do not comply with either the Contractor Quality Control Program or the contract provisions, or where the Contractor fails to properly operate and maintain an effective Quality Control Program, as determined by the Engineer, the Engineer may:

1) Order the Contractor to replace ineffective or unqualified quality control personnel or subcontractors.

2) Order the Contractor to stop operations until appropriate corrective actions are taken.

END OF SECTION 100

GENERAL PROVISIONS

Section 105 Mobilization

105-1 Description. This item shall consist of work and operations, but is not limited to, work and operations necessary for the movement of personnel, equipment, material and supplies to and from the project site for work on the project except as provided in the contract as separate pay items.

105-1.1 Posted notices. Prior to commencement of construction activities the Contractor must post the following documents in a prominent and accessible place where they may be easily viewed by all employees of the prime Contractor and by all employees of subcontractors engaged by the prime Contractor: Equal Employment Opportunity (EEO) Poster "Equal Employment Opportunity is the Law" in accordance with the Office of Federal Contract Compliance Programs Executive Order 11246, as amended; Davis Bacon Wage Poster (WH 1321) - DOL "Notice to All Employees" Poster; and Applicable Davis-Bacon Wage Rate Determination. These notices must remain posted until final acceptance of the work by the Owner.

105-2 Basis of measurement and payment. Based upon the contract lump sum price for "Mobilization" partial payments will be allowed as follows:

a. With first pay request, 25%.

b. When 25% or more of the original contract is earned, an additional 25%.

c. When 50% or more of the original contract is earned, an additional 40%.

d. After Final Inspection, Staging area clean-up and delivery of all Project Closeout materials as required by 90-11, the final 10%.

END OF SECTION 105

GENERAL PROVISIONS

Section 110 Method of Estimating Percentage of Material Within Specification Limits (PWL)

110-01 General. When the specifications provide for acceptance of material based on the method of estimating percentage of material within specification limits (PWL), the PWL will be determined in accordance with this section. All test results for a lot will be analyzed statistically to determine the total estimated percent of the lot that is within specification limits. The PWL is computed using the sample average (X) and sample standard deviation (S_n) of the specified number (n) of sublots for the lot and the specification tolerance limits, L for lower and U for upper, for the particular acceptance parameter. From these values, the respective Quality index, Q_L for Lower Quality Index and/or Q_U for Upper Quality Index, is computed and the PWL for the lot for the specified n is determined from Table 1. All specification limits specified in the technical sections shall be absolute values. Test results used in the calculations shall be to the significant figure given in the test procedure.

There is some degree of uncertainty (risk) in the measurement for acceptance because only a small fraction of production material (the population) is sampled and tested. This uncertainty exists because all portions of the production material have the same probability to be randomly sampled. The Contractor's risk is the probability that material produced at the acceptable quality level is rejected or subjected to a pay adjustment. The Owner's risk is the probability that material produced at the rejectable quality level is accepted.

It is the intent of this section to inform the Contractor that, in order to consistently offset the Contractor's risk for material evaluated, production quality (using population average and population standard deviation) must be maintained at the acceptable quality specified or higher. In all cases, it is the responsibility of the Contractor to produce at quality levels that will meet the specified acceptance criteria when sampled and tested at the frequencies specified.

110-02 Method for computing PWL. The computational sequence for computing PWL is as follows:

a. Divide the lot into n sublots in accordance with the acceptance requirements of the specification.

b. Locate the random sampling position within the sublot in accordance with the requirements of the specification.

c. Make a measurement at each location, or take a test portion and make the measurement on the test portion in accordance with the testing requirements of the specification.

d. Find the sample average (X) for all sublot values within the lot by using the following formula:

$$\mathbf{X = (x_1 + x_2 + x_3 + \ldots x_n) / n}$$

Where: X = Sample average of all sublot values within a lot

x_1, x_2 = Individual sublot values

n = Number of sublots

e. Find the sample standard deviation (S_n) by use of the following formula:

$S_n = [(d_1^2 + d_2^2 + d_3^2 + . . . d_n^2)/(n-1)]^{1/2}$

Where: S_n = Sample standard deviation of the number of sublot values in the set

d_1, d_2 = Deviations of the individual sublot values x_1, x_2, … from the average value X

that is: $d_1 = (x_1 - X)$, $d_2 = (x_2 - X)$ … $d_n = (x_n - X)$

n = Number of sublots

f. For single sided specification limits (that is, L only), compute the Lower Quality Index Q_L by use of the following formula:

$Q_L = (X - L) / S_n$

Where: L = specification lower tolerance limit

Estimate the percentage of material within limits (PWL) by entering Table 1 with Q_L, using the column appropriate to the total number (n) of measurements. If the value of Q_L falls between values shown on the table, use the next higher value of PWL.

g. For double-sided specification limits (that is, L and U), compute the Quality Indexes Q_L and Q_U by use of the following formulas:

$Q_L = (X - L) / S_n$
and
$Q_U = (U - X) / S_n$

Where: L and U = specification lower and upper tolerance limits

Estimate the percentage of material between the lower (L) and upper (U) tolerance limits (PWL) by entering Table 1 separately with Q_L and Q_U, using the column appropriate to the total number (n) of measurements, and determining the percent of material above P_L and percent of material below P_U for each tolerance limit. If the values of Q_L fall between values shown on the table, use the next higher value of P_L or P_U. Determine the PWL by use of the following formula:

$PWL = (P_U + P_L) – 100$

Where: P_L = percent within lower specification limit

P_U = percent within upper specification limit

EXAMPLE OF PWL CALCULATION

Project: Example Project

Test Item: Item P-401, Lot A.

A. PWL Determination for Mat Density.

1) Density of four random cores taken from Lot A.

A-1 = 96.60

A-2 = 97.55

A-3 = 99.30

A-4 = 98.35

n = 4

2) Calculate average density for the lot.

$X = (x_1 + x_2 + x_3 + \ldots x_n) / n$

X = (96.60 + 97.55 + 99.30 + 98.35) / 4

X = 97.95% density

3) Calculate the standard deviation for the lot.

$S_n = \mathbf{[}((96.60 - 97.95)^2 + (97.55 - 97.95)^2 + (99.30 - 97.95)^2 + (98.35 - 97.95)^2)) / (4 - 1)\mathbf{]}^{1/2}$

$S_n = \mathbf{[}(1.82 + 0.16 + 1.82 + 0.16) / 3\mathbf{]}^{1/2}$

$S_n = 1.15$

4) Calculate the Lower Quality Index Q_L for the lot. (L=96.3)

$Q_L = (X - L) / S_n$

$Q_L = (97.95 - 96.30) / 1.15$

$Q_L = 1.4348$

5) Determine PWL by entering Table 1 with Q_L= 1.44 and n= 4.

PWL = 98

B. PWL Determination for Air Voids.

1) Air Voids of four random samples taken from Lot A.

A-1 = 5.00

A-2 = 3.74

A-3 = 2.30

A-4 = 3.25

2) Calculate the average air voids for the lot.

$X = (x_1 + x_2 + x_3 \ldots n) / n$

$X = (5.00 + 3.74 + 2.30 + 3.25) / 4$

$X = 3.57\%$

3) Calculate the standard deviation S_n for the lot.

$S_n = \mathbf{[}((3.57 - 5.00)^2 + (3.57 - 3.74)^2 + (3.57 - 2.30)^2 + (3.57 - 3.25)^2) / (4 - 1)\mathbf{]}^{1/2}$

$S_n = \mathbf{[}(2.04 + 0.03 + 1.62 + 0.10) / 3\mathbf{]}^{1/2}$

$S_n = 1.12$

4) Calculate the Lower Quality Index Q_L for the lot. (L= 2.0)

$Q_L = (X - L) / S_n$

$Q_L = (3.57 - 2.00) / 1.12$

$Q_L = 1.3992$

5) Determine P_L by entering Table 1 with $Q_L = 1.41$ and n = 4.

$P_L = 97$

6) Calculate the Upper Quality Index Q_U for the lot. (U= 5.0)

$Q_U = (U - X) / S_n$

$Q_U = (5.00 - 3.57) / 1.12$

$Q_U = 1.2702$

7) Determine P_U by entering Table 1 with $Q_U = 1.29$ and n = 4.

$P_U = 93$

8) Calculate Air Voids PWL

$PWL = (P_L + P_U) – 100$

$PWL = (97 + 93) - 100 = 90$

EXAMPLE OF OUTLIER CALCULATION (REFERENCE ASTM E178)

Project: Example Project

Test Item: Item P-401, Lot A.

A. Outlier Determination for Mat Density.

1) Density of four random cores taken from Lot A arranged in descending order.

A-3 = 99.30

A-4 = 98.35

A-2 = 97.55

A-1 = 96.60

2) Use n=4 and upper 5% significance level of to find the critical value for test criterion = 1.463.

3) Use average density, standard deviation, and test criterion value to evaluate density measurements.

a. For measurements greater than the average:

If (measurement - average)/(standard deviation) is less than test criterion,

then the measurement is not considered an outlier

For A-3, check if (99.30 - 97.95) / 1.15 is greater than 1.463.

Since 1.174 is less than 1.463, the value is not an outlier.

b. For measurements less than the average:

If (average - measurement)/(standard deviation) is less than test criterion,

then the measurement is not considered an outlier.

For A-1, check if (97.95 - 96.60) / 1.15 is greater than 1.463.

Since 1.435 is less than 1.463, the value is not an outlier.

Note: In this example, a measurement would be considered an outlier if the density were:

Greater than (97.95 + 1.463 × 1.15) = 99.63%

OR

less than (97.95 - 1.463 × 1.15) = 96.27%.

Table 1. Table for Estimating Percent of Lot Within Limits (PWL)

Percent Within Limits (P_L and P_U)	Positive Values of Q (Q_L and Q_U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
99	1.1541	1.4700	1.6714	1.8008	1.8888	1.9520	1.9994	2.0362
98	1.1524	1.4400	1.6016	1.6982	1.7612	1.8053	1.8379	1.8630
97	1.1496	1.4100	1.5427	1.6181	1.6661	1.6993	1.7235	1.7420
96	1.1456	1.3800	1.4897	1.5497	1.5871	1.6127	1.6313	1.6454
95	1.1405	1.3500	1.4407	1.4887	1.5181	1.5381	1.5525	1.5635
94	1.1342	1.3200	1.3946	1.4329	1.4561	1.4717	1.4829	1.4914
93	1.1269	1.2900	1.3508	1.3810	1.3991	1.4112	1.4199	1.4265
92	1.1184	1.2600	1.3088	1.3323	1.3461	1.3554	1.3620	1.3670
91	1.1089	1.2300	1.2683	1.2860	1.2964	1.3032	1.3081	1.3118
90	1.0982	1.2000	1.2290	1.2419	1.2492	1.2541	1.2576	1.2602
89	1.0864	1.1700	1.1909	1.1995	1.2043	1.2075	1.2098	1.2115
88	1.0736	1.1400	1.1537	1.1587	1.1613	1.1630	1.1643	1.1653
87	1.0597	1.1100	1.1173	1.1192	1.1199	1.1204	1.1208	1.1212
86	1.0448	1.0800	1.0817	1.0808	1.0800	1.0794	1.0791	1.0789
85	1.0288	1.0500	1.0467	1.0435	1.0413	1.0399	1.0389	1.0382
84	1.0119	1.0200	1.0124	1.0071	1.0037	1.0015	1.0000	0.9990
83	0.9939	0.9900	0.9785	0.9715	0.9671	0.9643	0.9624	0.9610
82	0.9749	0.9600	0.9452	0.9367	0.9315	0.9281	0.9258	0.9241
81	0.9550	0.9300	0.9123	0.9025	0.8966	0.8928	0.8901	0.8882
80	0.9342	0.9000	0.8799	0.8690	0.8625	0.8583	0.8554	0.8533
79	0.9124	0.8700	0.8478	0.8360	0.8291	0.8245	0.8214	0.8192
78	0.8897	0.8400	0.8160	0.8036	0.7962	0.7915	0.7882	0.7858
77	0.8662	0.8100	0.7846	0.7716	0.7640	0.7590	0.7556	0.7531
76	0.8417	0.7800	0.7535	0.7401	0.7322	0.7271	0.7236	0.7211
75	0.8165	0.7500	0.7226	0.7089	0.7009	0.6958	0.6922	0.6896
74	0.7904	0.7200	0.6921	0.6781	0.6701	0.6649	0.6613	0.6587
73	0.7636	0.6900	0.6617	0.6477	0.6396	0.6344	0.6308	0.6282
72	0.7360	0.6600	0.6316	0.6176	0.6095	0.6044	0.6008	0.5982
71	0.7077	0.6300	0.6016	0.5878	0.5798	0.5747	0.5712	0.5686
70	0.6787	0.6000	0.5719	0.5582	0.5504	0.5454	0.5419	0.5394
69	0.6490	0.5700	0.5423	0.5290	0.5213	0.5164	0.5130	0.5105
68	0.6187	0.5400	0.5129	0.4999	0.4924	0.4877	0.4844	0.4820
67	0.5878	0.5100	0.4836	0.4710	0.4638	0.4592	0.4560	0.4537
66	0.5563	0.4800	0.4545	0.4424	0.4355	0.4310	0.4280	0.4257
65	0.5242	0.4500	0.4255	0.4139	0.4073	0.4030	0.4001	0.3980
64	0.4916	0.4200	0.3967	0.3856	0.3793	0.3753	0.3725	0.3705
63	0.4586	0.3900	0.3679	0.3575	0.3515	0.3477	0.3451	0.3432
62	0.4251	0.3600	0.3392	0.3295	0.3239	0.3203	0.3179	0.3161
61	0.3911	0.3300	0.3107	0.3016	0.2964	0.2931	0.2908	0.2892
60	0.3568	0.3000	0.2822	0.2738	0.2691	0.2660	0.2639	0.2624
59	0.3222	0.2700	0.2537	0.2461	0.2418	0.2391	0.2372	0.2358
58	0.2872	0.2400	0.2254	0.2186	0.2147	0.2122	0.2105	0.2093
57	0.2519	0.2100	0.1971	0.1911	0.1877	0.1855	0.1840	0.1829
56	0.2164	0.1800	0.1688	0.1636	0.1607	0.1588	0.1575	0.1566

Percent Within Limits (P_L and P_U)	**Positive Values of Q (Q_L and Q_U)**							
	n=3	**n=4**	**n=5**	**n=6**	**n=7**	**n=8**	**n=9**	**n=10**
55	0.1806	0.1500	0.1406	0.1363	0.1338	0.1322	0.1312	0.1304
54	0.1447	0.1200	0.1125	0.1090	0.1070	0.1057	0.1049	0.1042
53	0.1087	0.0900	0.0843	0.0817	0.0802	0.0793	0.0786	0.0781
52	0.0725	0.0600	0.0562	0.0544	0.0534	0.0528	0.0524	0.0521
51	0.0363	0.0300	0.0281	0.0272	0.0267	0.0264	0.0262	0.0260
50	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Percent Within Limits (P_L and P_U)	Negative Values of Q (Q_L and Q_U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
49	-0.0363	-0.0300	-0.0281	-0.0272	-0.0267	-0.0264	-0.0262	-0.0260
48	-0.0725	-0.0600	-0.0562	-0.0544	-0.0534	-0.0528	-0.0524	-0.0521
47	-0.1087	-0.0900	-0.0843	-0.0817	-0.0802	-0.0793	-0.0786	-0.0781
46	-0.1447	-0.1200	-0.1125	-0.1090	-0.1070	-0.1057	-0.1049	-0.1042
45	-0.1806	-0.1500	-0.1406	-0.1363	-0.1338	-0.1322	-0.1312	-0.1304
44	-0.2164	-0.1800	-0.1688	-0.1636	-0.1607	-0.1588	-0.1575	-0.1566
43	-0.2519	-0.2100	-0.1971	-0.1911	-0.1877	-0.1855	-0.1840	-0.1829
42	-0.2872	-0.2400	-0.2254	-0.2186	-0.2147	-0.2122	-0.2105	-0.2093
41	-0.3222	-0.2700	-0.2537	-0.2461	-0.2418	-0.2391	-0.2372	-0.2358
40	-0.3568	-0.3000	-0.2822	-0.2738	-0.2691	-0.2660	-0.2639	-0.2624
39	-0.3911	-0.3300	-0.3107	-0.3016	-0.2964	-0.2931	-0.2908	-0.2892
38	-0.4251	-0.3600	-0.3392	-0.3295	-0.3239	-0.3203	-0.3179	-0.3161
37	-0.4586	-0.3900	-0.3679	-0.3575	-0.3515	-0.3477	-0.3451	-0.3432
36	-0.4916	-0.4200	-0.3967	-0.3856	-0.3793	-0.3753	-0.3725	-0.3705
35	-0.5242	-0.4500	-0.4255	-0.4139	-0.4073	-0.4030	-0.4001	-0.3980
34	-0.5563	-0.4800	-0.4545	-0.4424	-0.4355	-0.4310	-0.4280	-0.4257
33	-0.5878	-0.5100	-0.4836	-0.4710	-0.4638	-0.4592	-0.4560	-0.4537
32	-0.6187	-0.5400	-0.5129	-0.4999	-0.4924	-0.4877	-0.4844	-0.4820
31	-0.6490	-0.5700	-0.5423	-0.5290	-0.5213	-0.5164	-0.5130	-0.5105
30	-0.6787	-0.6000	-0.5719	-0.5582	-0.5504	-0.5454	-0.5419	-0.5394
29	-0.7077	-0.6300	-0.6016	-0.5878	-0.5798	-0.5747	-0.5712	-0.5686
28	-0.7360	-0.6600	-0.6316	-0.6176	-0.6095	-0.6044	-0.6008	-0.5982
27	-0.7636	-0.6900	-0.6617	-0.6477	-0.6396	-0.6344	-0.6308	-0.6282
26	-0.7904	-0.7200	-0.6921	-0.6781	-0.6701	-0.6649	-0.6613	-0.6587
25	-0.8165	-0.7500	-0.7226	-0.7089	-0.7009	-0.6958	-0.6922	-0.6896
24	-0.8417	-0.7800	-0.7535	-0.7401	-0.7322	-0.7271	-0.7236	-0.7211
23	-0.8662	-0.8100	-0.7846	-0.7716	-0.7640	-0.7590	-0.7556	-0.7531
22	-0.8897	-0.8400	-0.8160	-0.8036	-0.7962	-0.7915	-0.7882	-0.7858
21	-0.9124	-0.8700	-0.8478	-0.8360	-0.8291	-0.8245	-0.8214	-0.8192
20	-0.9342	-0.9000	-0.8799	-0.8690	-0.8625	-0.8583	-0.8554	-0.8533
19	-0.9550	-0.9300	-0.9123	-0.9025	-0.8966	-0.8928	-0.8901	-0.8882
18	-0.9749	-0.9600	-0.9452	-0.9367	-0.9315	-0.9281	-0.9258	-0.9241
17	-0.9939	-0.9900	-0.9785	-0.9715	-0.9671	-0.9643	-0.9624	-0.9610
16	-1.0119	-1.0200	-1.0124	-1.0071	-1.0037	-1.0015	-1.0000	-0.9990
15	-1.0288	-1.0500	-1.0467	-1.0435	-1.0413	-1.0399	-1.0389	-1.0382
14	-1.0448	-1.0800	-1.0817	-1.0808	-1.0800	-1.0794	-1.0791	-1.0789
13	-1.0597	-1.1100	-1.1173	-1.1192	-1.1199	-1.1204	-1.1208	-1.1212
12	-1.0736	-1.1400	-1.1537	-1.1587	-1.1613	-1.1630	-1.1643	-1.1653
11	-1.0864	-1.1700	-1.1909	-1.1995	-1.2043	-1.2075	-1.2098	-1.2115
10	-1.0982	-1.2000	-1.2290	-1.2419	-1.2492	-1.2541	-1.2576	-1.2602
9	-1.1089	-1.2300	-1.2683	-1.2860	-1.2964	-1.3032	-1.3081	-1.3118
8	-1.1184	-1.2600	-1.3088	-1.3323	-1.3461	-1.3554	-1.3620	-1.3670
7	-1.1269	-1.2900	-1.3508	-1.3810	-1.3991	-1.4112	-1.4199	-1.4265
6	-1.1342	-1.3200	-1.3946	-1.4329	-1.4561	-1.4717	-1.4829	-1.4914
5	-1.1405	-1.3500	-1.4407	-1.4887	-1.5181	-1.5381	-1.5525	-1.5635
4	-1.1456	-1.3800	-1.4897	-1.5497	-1.5871	-1.6127	-1.6313	-1.6454

Percent Within Limits (P_L and P_U)	**Negative Values of Q (Q_L and Q_U)**							
	n=3	**n=4**	**n=5**	**n=6**	**n=7**	**n=8**	**n=9**	**n=10**
3	-1.1496	-1.4100	-1.5427	-1.6181	-1.6661	-1.6993	-1.7235	-1.7420
2	-1.1524	-1.4400	-1.6016	-1.6982	-1.7612	-1.8053	-1.8379	-1.8630
1	-1.1541	-1.4700	-1.6714	-1.8008	-1.8888	-1.9520	-1.9994	-2.0362

END OF SECTION 110

SPECIAL PROVISIONS

BID DOCUMENTS

DFS TERMINAL, HANGAR, AND APRON EXPANSION
DEFUNIAK SPRINGS AIRPORT

SPECIAL PROVISION NO. 1

UTILITIES

A. Description

The Contractor shall be responsible for the coordination and associated costs to protect existing facilities, utilities and features that may be impacted by the project.

B. General

Existing facilities, utilities and features depicted on the construction plans are not guaranteed to be accurate with respect to location, depth, condition or characteristics. Also, there may be additional facilities and features existing that could affect the construction of this project, which are not depicted or described in the construction plans. Prior to bidding, the Contractor shall make a thorough investigation of the project area to satisfy himself/herself as to the location, condition and characteristics of any and all facilities and features, which may affect the work. No additional compensation will be made for any extra expense relating to an existing facility or feature. The Contractor hereby agrees to make no claims against the Owner, the Engineer, and their representatives relating to the existence or lack thereof, location, condition and/or characteristics of any existing facilities or features

C. Protection of Existing Utilities

Airfield lighting cables; electric power lines; telephone lines; computer cables; airport power and control cables; transmission and distribution water lines; and sanitary force mains may be located in the areas of construction. Disruption of these utilities could seriously disrupt the operation of the airport. Actual locations are uncertain, and the Contractor is required to verify all locations.

Power and control cables leading to and from any Navaids and other facilities shall be protected from any possible damage, including crossing with unauthorized equipment, etc. No grading will be permitted over the cables under any conditions unless shown on the drawings or approved by the Engineer. These provisions intend to make perfectly clear the need for protection of Navaids and other facility cables by the Contractor at all times.

If damage occurs to any utilities, the Contractor may be assessed a fee of $2,000 liquidated damages per cut, which shall only represent the expense incurred by the Owner in coordinating the repair, and which shall not prevent the Owner or others from recovering from the Contractor costs or expenses of any other nature due to damages to utilities. The Contractor will also reimburse the appropriate utility owner for all material and labor costs to repair damaged utilities.

It is understood and agreed that the Owner does not guarantee the accuracy or the completeness of the location information relating to existing utility services, facilities or structures that may be shown on the exhibits or encountered in the work. Any inaccuracy or omission in such information will not relieve Contractor of his responsibility to protect such existing features from damage or unscheduled interruption of service.

It is further understood and agreed that the Contractor shall, upon execution of the contract, notify

the Owner of all utility services or other facilities of his plan of operations. Such notification shall be in writing addressed to the appropriate point-of-contact as provided herein. A copy of each notification shall be given to the Engineer.

In addition to the general written notification provided, it shall be the responsibility of the Contractor to keep such individual Owners advised of changes in his plan of operation that would affect such Owners.

Prior to commencing the work in the general vicinity of an existing utility service or facility, the Contractor shall again notify each such Owner in writing, through the Project Manager, of the plan of operations. If, in the Contractor's opinion, the Owner's assistance is needed to locate the utility service or facility or the presence of a representative of the Owner is desirable to observe the work, such advice should be included in the written notification. Such notification shall be given through the Project Manager by the most expeditious means to reach the utility Owners point-of-contact no later than two normal business days prior to the Contractor's commencement of operations in such general vicinity. The Contractor's failure to give two (2) days notice shall be cause for the Project Manager to suspend construction operations in the general vicinity of a utility service or facility.

Where the outside limits of an underground utility service have been located and staked on the ground, the Contractor shall be required to use excavation methods acceptable to the Project Manager within three (3) feet of the outside limits, at such points as may be required to insure protection from damage due to the Contractors operations. Excavation methods could include the use of hand digging tools, the use of non-ferrous hand tools and could exclude the use of long-handled metal spades.

Should the Contractor damage or interrupt the operation of a utility service or facility by accident or otherwise, he shall immediately notify the proper utility company and the Project Manager and shall take all reasonable measures to prevent further damage or interruption of service. The Contractor, in such events, shall cooperate with the utility service or facility-Owner and the Project Manager continuously until such damage has been repaired and service restored to the satisfaction of the utility or facility Owner.

The Contractor shall bear all direct and indirect costs of damage and restoration of service to any utility service or facility due to his operations, whether or not due to negligence or accident. The Owner reserves the right to deduct such costs from any monies due or which may become due the Contractor or his surety.

Airport owned facilities and properties and privately owned facilities located on airport property, including underground cables, pavements, piping, buildings, turfed areas, vehicles and other facilities/improvements, that are damaged by the Contractor shall, at the election of the Owner, (1) be replaced/repaired by the Contractor to the satisfaction of the Owner or (2) be replaced/repaired by the Owner at the Contractor's expense.

All utilities not shown in the plans and found by the Contractor shall be recorded by the Contractor and submitted to the Airport Manager or Project Manager as Record Drawings.

END OF SP-1

SPECIAL PROVISION NO. 2
AIRPORT PROJECT PROCEDURES

A. Permits
Contractor shall be required to procure and pay for all construction permits if required, and arrange for all inspections and similar procedural items as required by the code enforcement authorities having jurisdiction.

B. Airport Operations
Airport operations shall be maintained throughout this Contract. The Contractor shall in no way curtail or handicap normal operational characteristics of the airport facility except as specifically indicated and specified in these Contract Documents.

C. Limits of Construction
Any surface graded or disturbed outside the construction limits as shown on the plans will be restored and sodded or seeded and mulched as directed by the Engineer at the Contractor's expense.

D. Construction Layout and Stakes
Contractor shall furnish all lines, grades and measurements necessary for the proper prosecution and control of the work and contracted for under these specifications. The Contractor will establish horizontal and vertical control points only. Contractor is thereafter responsible to maintain these control points for use by subsequent contractors.

E. Verification of Existing Conditions
Prior to bidding and commencing with construction, the Contractor shall familiarize himself as to the existing conditions. Should the Contractor discover any inaccuracies, errors or omissions between the actual existing conditions and the Contract Documents, he shall within seven (7) calendar days prior to Bid Opening, notify the Engineer in writing. Submission of Bid by the Contractor shall be held as an acceptance of the existing conditions by the Contractor.

F. Safety and Protection
1. Safety: Inasmuch as each work area will be accessible to and used by the public, the Owner and other companies doing business at the Airport during the construction period, it is the Contractor's responsibility to maintain each work area in a safe, hazard free condition at all times. Should the Owner find the area unsafe at any time, they will notify the Contractor, and the Contractor shall take whatever steps necessary to remedy the unsafe condition. Should the Contractor not be immediately available for corrective action, the Owner will remedy the problem and the Contractor shall reimburse the Owner for the expense of such correction.

2. Protection of Property: Fixed structures, equipment, paving, landscaping and vehicles (automobiles, trucks, etc.) shall be protected with drop cloths, shielding and other appropriate measures to ensure maximum protection of all property and vehicles.

G. Pre-Construction Conference
Before beginning work at the site, the Contractor shall attend a pre-construction conference and bring with him the superintendent employed for this project. In the event the Contractor is unable to attend, he shall send a letter of introduction with the superintendent in which he advises the superintendent's full name and states that he is assigned to the project and will be in full responsible charge. This conference will be called by the Engineer, who will arrange for the Owner's representative

and other interested parties to be present. At this time, all parties will discuss the project under contract and prepare a program of procedure in keeping with requirements of the drawings and specifications. The superintendent will henceforth make every effort to expeditiously coordinate all phases of the work, including the required reporting procedure, to obtain the end result within the full purpose and intent of the drawings and specifications for the project.

H. Coordination and Progress Meetings

1. Weekly Coordination and Progress Meetings: The Contractor / Engineer will hold weekly general project coordination and progress meetings at regularly scheduled times convenient for all parties involved. These meetings are in addition to specific meetings held for other purposes, such as special project meetings and special pre-installation meetings. The Engineer will require representation at each meeting by every party currently involved in coordination or planning for the work of the entire project. Meetings will be conducted in a manner which will resolve coordination problems.

2. The Engineer will record results of the meeting and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

I. Administrative/Supervisory Personnel

The Contractor shall provide a full-time Project Management Team consisting of a Contractor's Engineer, Project Superintendent and other supervisory personnel for the duration of the Project. The names and qualifications of this team for this work shall be submitted to the Owner as part of the Bidder Qualification Form. They shall have a minimum of five (5) years of experience on suitable projects of equal difficulty. Either the Contractor's Engineer or the Project Superintendent shall be at the construction site at all periods when work is in progress. This person shall have full authority to act in the Contractor's behalf. It is agreed and understood that, if requested in writing by the Owner, the Contractor shall replace any member of the team with another meeting the required qualifications within three (3) days of the receipt of the request.

J. Special Reports

1. Reporting Unusual Events: When an event of an unusual and significant nature occurs at the site, the Contractor shall prepare and submit a special report to the Engineer. List chain of events, persons participating, response by the Contractor's personnel, an evaluation of the results or effects and similar pertinent information. Advise the Owner and Engineer as soon as possible when such events are known.

2. Submit special reports directly to the Owner within one day of occurrence. Submit a copy of the report to the Engineer and other entities that are affected by the occurrence within one day of the occurrence.

K. Schedule of Work

1. Prepare and submit, in triplicate, for the Engineer's information, progress schedules for the work.

2. Progress schedules shall relate to the entire project to the extent required by the Contract Documents and shall provide for expeditious and practicable execution of the work.

3. Progress schedules shall be updated monthly.

4. Percent complete shall be based on actual construction in place or dollar volume of the work. If dollar volume of the work reflects the greater percent complete, the maximum percent complete shall in no case exceed 5 percent of the value of the in-place construction.

L. Progress Schedule

1. Preliminary Schedule: Within 15 days after date of Notice of Award and Acceptance or at the Pre-Construction Conference, whichever is earlier, the Contractor shall submit his preliminary network phasing diagram (Preliminary Schedule) indicating a comprehensive overview of the Project including an activity line for each of the work segments to be performed at the site.

   a. Arrange the schedule to indicate required sequencing of work and to show time allowances for submittals, inspections, and similar time margins.

   b. The submitted schedule will be reviewed by the Engineer and Owner for conformance to Critical Dates and overall project completion time criteria. Lack of this information will be cause for rejection of the schedule.

   c. Following initial submittal of the schedule to and response by the Engineer, print and distribute the Progress Schedule to entities with a need-to-know responsibility, including three (3) copies to the Engineer. Revise at intervals matching payment requests, and redistribute and repost. Provide the copies required with payment requests.

M. Maintenance of Schedule

The Contractor's Progress Schedule must be updated on a monthly basis, and a copy thereof submitted with each of the Contractor's Applications for Payment. The updated Progress Schedule shall not only indicate revisions to the Schedule for upcoming work but show "as-built" schedule progress data. The Engineer will not recommend for payment by the Owner an Application for Payment without the Contractor's submission of a Monthly Schedule Update.

1. If the Contractor's Monthly Schedule Update reflects, or the Engineer determines, that the Contractor is at least ten percent (10%) behind the original Progress Schedule or fourteen (14) or more calendar days behind the original Progress Schedule for:

   a. the work as a whole;

   b. a major Contract item;

   c. an item of work which is on the critical path; or

   d. an item of work not on the original critical path that, because of the delay or anticipated delay became a critical path item;

   then the Contractor must submit with the Monthly Schedule Update his proposed plan for bringing the work back on schedule and completing the Work within the Contract time.

2. The Progress Schedule shall be coordinated by the Owner's Project Administrator with the overall schedule for the Airport Projects. The Contractor is required to revise the Progress Schedule promptly in accordance with the conditions of the work, subject to approval by the Owner's Project Coordinator and the Engineer.

3. The Contractor shall comply fully with all time and other requirements of the Contract Documents. Recommendation of an Application of Payment by the Engineer and payment thereon by the Owner, without the submission of a Monthly Schedule Update, shall not constitute a waiver of the requirements of such updates, nor shall it relieve the Contractor from the obligation to complete the Work within the Contract Time.

4. Should a review of work indicate a critical path (milestone) item has fallen behind the approved schedule, at the option of the Engineer, funds equal to the established liquidated damages for the number of calendar days behind schedule will be withheld until that critical path item is brought back on schedule.

N. Changes in the Schedule

1. Minor Changes: Each week, prior to the weekly coordination meeting during the time of the contract, the Contractor shall notify the Engineer and Engineer of any minor changes that are anticipated in the schedule for the following week.

2. Major Changes: If for any reason a major change in the approved schedule is anticipated, the Contractor shall make the necessary changes to the schedule and resubmit the revised schedule for approval.

   Copies of the approved schedule shall be posted in the Contractor's field office with completed work identified in colored pencil.

O. Maintenance of Traffic

1. The Contractor shall not obstruct nor create a hazard to any traffic during the prosecution of the work and shall be responsible for repair of all damage to existing pavement or facilities caused by his operations.

2. Beginning date of Contractor's Responsibility: The Contractor's responsibility for maintenance of traffic shall begin on the day he starts the work and continue until Final Completion and Acceptance of the Project.

3. Sections Not Requiring Traffic Maintenance: The Contractor will not be required to maintain traffic over those portions of the Project where no work is to be accomplished or where construction operations will not affect aircraft operations. The Contractor, however, shall not obstruct nor create a hazard to any traffic during the prosecution of the work and shall be responsible for repair of any damage to existing pavement or facilities caused by his operations.

4. Traffic During Construction: All construction vehicles are required to use existing traffic routes. Normal traffic lanes are not to be used as staging areas for arriving delivery vehicles. The Contractor's employees shall utilize the designated Contractor employee parking area.

5. Contractor Signing: The Contractor may furnish and install construction traffic directional signs along the existing traffic route. The signs shall depict Contractor's logo or name, directional arrows and "deliveries". Signs shall be of sufficient size to have 6" high message and shall be located at each decision point. All signs and their locations shall be approved by the Engineer. NO OTHER SIGNS ARE PERMITTED.

6. Material Deliveries: The Contractor shall make his own material and equipment deliveries. No deliveries shall be made by vendors or suppliers without escort by a representative of the Contractor.

7. Notification: On days when construction traffic is expected to be extra heavy or when oversized pieces of equipment are to be delivered, give minimum forty-eight (48) hours notice to the Engineer.

8. All Contractor material orders for the work site shall be delivered to the areas designated as the Contractor's receiving area. All deliveries shall be made only during the Contractor's working hours.

9. Interference Request:
   a. The Contractor shall be responsible for notifying the Owner in writing and securing approval for any and all interruptions or interference with traffic (pedestrian, automobile or other necessary function of the Airport.

   b. The request shall include a traffic control plan indicating barricades, lighting and flagger where required.

   c. Such notification shall be made as soon as possible but in no case less than 48 hours prior to interference.

   d. It is suggested that the Contractor utilize a standard form addressed to the Owner with a blank space for a description of the interference, the exact area affected, the exact times and dates the interference will take place and blanks for the Owner's approval. The forms shall be submitted in duplicate. No interference will be allowed until the Contractor has received back a copy of the approved interference request form.

10. Personnel Traffic:
    a. General: All construction personnel shall be restricted to construction areas. They shall wear shirts with sleeves and long pants at all times.

    b. Use of Public Areas: The Contractor's workmen shall not utilize public areas for taking their "work breaks" or "lunch breaks." Areas for this purpose can be designated by the Owner upon request. No Public Toilets shall be used by any workmen at any time.

P. Daily Clean-Up and Trash Removal

1. Debris from this work shall be promptly removed from the site at least daily. It shall not be allowed to become a hazard to the safety of the public.

2. The Contractor shall be responsible for clean-up and trash removal. Accumulation of trash and debris will not be allowed and the Engineer may at any time direct the Contractor to immediately remove his trash and debris from the site of the work when in the opinion of the Owner such trash constitutes a nuisance or in any way hinders the work or the Airports operations. If the Contractor should fail to remove his trash and debris from the site of the work in a timely manner, the Owner may have this work performed and deduct the cost of such from Contractor's payment.

Q. Cleaning and Protection

1. General: During handling and installation of work at the project site, clean and protect work in progress and adjoining work on the basis of continuous daily maintenance. Apply protective covering on installed work to ensure freedom from damage or deterioration.

2. Clean and perform maintenance on installed work as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

3. Limiting Exposures of Work: To the extent possible through appropriate control and protection methods, supervise performance of the work in such a manner and by such means which will ensure that none of the work, whether completed or in progress, will be subjected to harmful, dangerous, damaging or otherwise deleterious exposure during the construction period. Such exposures include, where applicable, but not by way of limitation the following:

    a. Excessive static or dynamic loading
    b. Excessive internal or external pressures
    c. Solvents
    d. Chemicals
    e. Light
    f. Puncture
    g. Abrasion
    h. Heavy Traffic
    i. Soiling
    j. Combustion
    k. High speed operation, improper lubrication, unusual wear
    l. Improper shipping or handling
    m. Theft
    n. Vandalism

4. Protection at Openings: The Contractor shall provide protection at all openings in structures and finishes to maintain the building weather and dust tight. All protection shall be of solid material and substantial so that it will not be disturbed by wind and weather normal to the area and season, and also tight fitting to prevent noise infiltration.

5. Protection of Improvements:
    a. Damage to Existing Facilities: Existing surfaces and materials of the Owner's property not requiring work by the Contract Documents that is damaged by the Contractor's operations shall be immediately repaired. Repaired surfaces and materials shall match existing adjacent undamaged surfaces and materials. Repair work shall be coordinated with the Engineer and Owner with regard to time and method.

    b. Accidental Demolition: All structures or parts thereof that may become damaged due to accident or Contractor's error shall be restored to their original condition at no cost to the Owner. Materials and equipment being used in the repair or replacement resulting from damage shall be new and shall perform at the manufacturer's published capacities. If the existing equipment or materials cannot be identified, or if unavailable, the selection of the replacement will be subject to approval by the Engineer in writing.

6. Overhead Protection

a. No cranes or other construction equipment shall cross over non-construction personnel, their travel ways or ride systems.

b. The plan of operation of cranes and other hoisting equipment shall be established in writing by the Contractor. This plan of operation shall be subject to approval by the Engineer.

R. Conservation and Salvage

General: It is a requirement for supervision and administration of the Work that construction operations be carried out with the maximum possible consideration given to conservation of energy, water and materials. In addition, maximum consideration shall be given to salvaging materials and equipment involved in performance of the work but not incorporated therein. Refer to other sections for required disposition of salvaged materials which are the Owner's property.

S. Testing Cost Borne by Owner

Unless otherwise specified herein, all initial construction "Quality Assurance" testing costs shall be borne by the Owner. An independent testing laboratory selected and responsible to the Engineer shall perform all "Quality Assurance" testing required by the technical specifications or as directed by the Owner and/or the Engineer.

T. Testing Cost Borne by Contractor

The Contractor shall bear the cost of all “Quality Control” testing to include the following conditions:

1. If substitute materials or equipment are proposed by the Contractor, he shall pay the cost of all tests which may be necessary to satisfy the Engineer that specification requirements are satisfied. The Contractor shall pay for the Engineer's time spent in review and administrating such proposed substitution.

2. If materials or workmanship are used which fail to meet specification requirements, the Contractor shall pay the cost of all re-testing, including laboratory costs, deemed necessary by the Engineer to determine the safety or suitability of the material or element. The Contractor shall make arrangements with the Owner's Testing Laboratory to have all re-testing costs billed directly to the Contractor, or deducted from amounts due to the Contractor unless otherwise directed by the Engineer in writing. The Contractor shall take prompt action to insure that all re-testing costs are paid in a reasonable time period.

3. The Contractor shall pay for all testing costs including, but not limited to, power, fuel, and equipment cost, which may be required for complete testing of all equipment and systems for proper operation.

4. The Contractor shall pay for all testing required for materials, job mix designs, equipment, structures and related items included in all shop drawings and other submittals as required by the Technical Specifications to be submitted and approved by the Engineer prior to construction.

5. The Contractor shall bear all costs necessary for the Quality Control testing as stipulated in General Provisions Section 100.

U. Project Documentation

1. Project Drawings: The successful Contractor will be furnished, at no charge, four (4) copies of drawings and specifications. Additional copies may be purchased at actual cost of reproduction.

A field set of drawings and specifications shall remain on the job site at all times and shall be available at all times to the Engineer. The field set shall be continuously updated to reflect the "as-built" condition of all work included in this Contract.

The Contractor shall immediately include plainly and conspicuously on the field set of drawings, and at appropriate paragraphs in the specifications, all changes or corrections made by addenda and change orders as they are issued.

Approved copies of all shop drawings and other submittals are to be kept on the job site at all times and shall be available at all times to the Engineer.

Changes and deviations from the existing conditions shall be submitted in writing for approval prior to installation. In no case shall any unspecified equipment or materials be installed without prior approval by the Engineer.

2. Record Documents:
   a. Definition: Record copies are defined to include those documents or copies relating directly to performance of the work, which the Contractor is required to prepare or maintain for the Owner's records, recording the work as actually performed. In particular, record copies show changes in the work in relation to the way in which work was shown and specified by the original contract documents and show additional information of value to the Owner's records but not indicated by the original Contract Documents.

      Record copies include newly-prepared drawings (if any are specified), marked-up copies of contract drawings, shop drawings, specifications, addenda and change orders, marked-up product data submittals, record samples, field records for variable and concealed conditions such as excavations and foundations, and miscellaneous record information on work which is otherwise recorded only schematically or not at all.

   b. Record Drawings: The Contractor shall maintain a set of Record Drawings at the job site. These shall be kept legible and current and shall be available for inspection at all times by the Engineer. Show all changes or work added on these Record Drawings in a contrasting color.

      (1) Mark-up Procedure: During progress of the work, maintain a white-print set (blue-line or black-line) of contract drawings and shop drawings, with mark-up of actual installations which vary substantially from the work as originally shown. Mark whatever drawing is most capable of showing actual physical condition, fully and accurately. Where shop drawings are marked up, mark cross-reference on contract drawings at corresponding location. Mark with erasable colored pencil, using separate colors where feasible to distinguish between changes for different categories of work at the same general location. Mark-up important additional information, which was either shown schematically or omitted from original drawings. Give particular attention to information on work concealed, which would be difficult to identify or measure and record at a later date. Note alternate numbers, change order numbers and similar identification. Require each person preparing the mark-up to initial and date the mark-up and indicate the name of the firm. Label each sheet "PROJECT RECORD" in 1-1/2 inch high letters.

In showing changes in the work, use the same legends as used on the original drawings. Indicate exact locations by dimensions and exact elevations by job datum. Give dimensions from a permanent point.

(2) Preparation of Transparencies: In preparation for certification of substantial completion on the last major portion of the work, review the completed mark-up of record drawings and shop drawings with the Engineer. The Engineer will then proceed with preparation of a full set of corrected transparencies for contract drawings. The Engineer will date each updated drawing and label each sheet "PROJECT RECORD" in 1-1/2 inch high letters. Printing as required herein is the responsibility of the Engineer.

(3) Copies, Distribution: Upon completion of transparency record drawings, the Engineer shall prepare three blueline or blackline prints of each drawing, regardless of whether changes and additional information were recorded thereon. The Engineer shall then organize each of the three copies into manageable sets, bind with durable paper cover sheets, and print suitable titles and dates. The mark-up set of prints maintained during the construction period shall be bound in the same manner. The Engineer will retain one copy set. At the completion of the project, the Engineer shall submit one set of mylars and one set of prints with changes noted thereon to the Owner.

c. Record Drawings shall contain the names, addresses and phone numbers of the General Contractor and the major subcontractors.

d. The Engineer shall be the sole judge of the acceptability of the Record Drawings. Receipt and acceptance of the As-Built drawings is a pre-requisite for Final Payment.

3. Record Specifications
   a. During the progress of the work, maintain one copy of specifications, including addenda, change orders and similar modifications issued in printed form during construction. Mark-up variations (of substance) in actual work in comparison with text of specifications and modifications as issued. Give particular attention to substitutions, selection of options, and similar information on work where it is concealed or cannot otherwise be readily discerned at a later date by direct observation. Note related record drawing information and product data where applicable. Upon completion of the mark-up, submit to the Engineer for the Owner's records. Label the front cover "PROJECT RECORD" in 1-1/2 inch high letters.

   b. Where the manual is printed on one side of the page only, mark variations on the blank left-hand pages of the Project Manual, facing printed right-hand pages containing original text affected by variation.

4. Record Product Data
   During progress of the work, maintain one copy of each product data submittal and mark up significant variations in the actual work in comparison with submitted information. Include both variations in product as delivered to site and variations from the manufacturer's instructions and recommendations for installation. Give particular attention to concealed products and portions of the work which cannot otherwise be readily discerned at a later date by direct observation. Note related change orders and mark-ups of record drawings and specifications. Upon completion of the mark-up, submit a complete set of product data submittals to the Engineer for the Owner's records. Label each data submittal "PROJECT RECORD" in 1-1/2 inch high letters.

5. Record Sample Submittal
   Immediately prior to the date(s) of substantial completion, the Engineer and Owner's personnel will meet with the Contractor on site and will determine if any of the submitted samples maintained by the Contractor during progress of the work are to be transmitted to the Owner for record purposes. Comply with the Engineer's instructions for packaging, identification marking and delivery to the Owner's sample storage space. Dispose of other samples in the manner specified for disposal of surplus and waste materials, unless otherwise indicated by the Engineer.

6. Miscellaneous Record Submittals
   Refer to other sections of these specifications for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the work. Immediately prior to the date(s) of substantial completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Engineer for the Owner's records. Categories of requirements resulting in miscellaneous work records are recognized to include, but are not limited to, the following:

   a. Required field records on excavations, foundations, underground construction, wells and similar work.

   b. Accurate survey showing locations and elevations of underground lines, including invert elevations of drainage piping, valves, tanks and manholes.

   c. Surveys by a Registered Land Surveyor establishing lines and levels of finished construction.

   d. Soil treatment certification.

   e. Inspection and Test Reports: Where not processed as shop drawings or product data.

   f. Asphalt or PCC concrete pavement or structural mix design record.

   g. Concrete block certification.

7. Project Closeout
   Closeout is hereby defined to include general requirements near end of Contract Time, in preparation for final acceptance, final payment, normal termination of contract, occupancy by the Owner and similar actions evidencing completion of the work. Specific requirements for individual units of work are specified in other sections. Time of closeout is directly related to substantial completion, and therefore may be a single time period for the entire work or a series of time periods for individual parts of the work which have been certified as substantially complete at different dates. The time variation, if any, shall be applicable to other provisions of this section.

8. Prerequisites to Substantial Completion
   a. Prior to requesting the Engineer's inspection for certification of substantial completion, for either the entire work or portions thereof, complete the following and list known exceptions in request:

      (1) In the progress payment request coincident with or first following the date claimed, show 100% completion for the portion of work claimed as "substantially completed", or list incomplete items, value of incompletion, and reasons for being incomplete.

(2) Include supporting documentation for completion as indicated in the Contract Documents.

(3) Submit statement showing accounting of changes to the Contract Sum.

(4) Advise the Owner of pending insurance change-over requirements.

(5) Obtain and submit releases enabling the Owner's full and unrestricted use of the work and access to services and utilities, including, where required, occupancy permits, operating certificates, and similar releases.

(6) Deliver tools, spare parts, extra stocks of materials, and similar physical items to the Owner.

(7) Make the final change-over of locks and transmit keys to the Owner and advise Owner's personnel of change-over in security provisions.

(8) Complete start-up testing of systems and instructions of Owner's operating-maintenance personnel. Discontinue or change over and remove from the project site, temporary facilities and services, along with construction tools and facilities, mock-ups and similar elements.

b. Inspection Procedures: Upon receipt of the Contractor's request, the Engineer will proceed with inspection or advise the Contractor of prerequisites not fulfilled. Following initial inspection, the Engineer will prepare a Certificate of Substantial Completion or advise the Contractor of the work which must be performed prior to issuance of the Certificate and will perform a repeat inspection when requested and assured by the Contractor that the work has been substantially completed. Results of the completed inspection will form the initial "punchlist" for final acceptance.

9. Prerequisites to Final Acceptance
   a. Prior to requesting the Engineer's final inspection for certification of final acceptance as required by the General Provisions, the Contractor shall complete the following and list known exceptions in the request:

      (1) Submit a certified copy of the Engineer's final punchlist of itemized work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, endorsed and dated by the Engineer.

      (2) Submit final meter readings for utilities, measured record of stored fuel, and similar data as of time of substantial completion or when the Owner took possession of and responsibility for corresponding elements of the work.

      (3) Complete final cleaning up requirements, including touch-up of marred surfaces.

      (4) Touch up and otherwise repair and restore marred exposed finishes.

   b. Re-inspection Procedures: Following Substantial Completion, the Contractor shall correct or remedy all Punchlist items to the satisfaction of the Engineer and Owner within a two (2) week

period after the Date of Substantial Completion. If subsequent inspections are necessary after the two week period in order to eliminate all deficiencies, the cost of all subsequent inspections with respect to the Owner and Engineer's time shall be paid by the Contractor. When ready, the Contractor shall request in writing a final inspection of the work. Upon completion of re-inspection, the Engineer will prepare a Certificate of Final Acceptance or advise the Contractor of work not completed or obligations not fulfilled as required for Final Acceptance. If necessary, the procedures will be repeated.

10. Prerequisites to Final Payment
    a. Final Payment: Final Payment will be made after final acceptance of the project by the Engineer and Owner upon request by the Contractor on condition that the Contractor:

        (1) Furnish properly executed complete releases of lien from all materialmen and subcontractors who have furnished materials or labor for the Work and submit supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

        (2) Furnish the Contractor's Affidavit of Release of Liens (2 copies) that all materialmen and subcontractors have been paid in full. In the event they have not been paid in full, the Owner shall retain a sufficient sum to pay them in full and at his option may make direct payment as provided in Chapter 84, Florida Statutes, as amended, to obtain complete releases of lien.

        (3) Furnish Contractor's Affidavit of Debts and Claims (2 copies).

        (4) Furnish required sets of record drawings and maintenance and operating instructions of new mechanical equipment.

        (5) Furnish guarantees signed by subcontractors, material suppliers, and countersigned by the Contractor for operating equipment.

        (6) Submit specific warranties, workmanship-maintenance bonds, maintenance agreements, final certifications and similar documents.

        (7) Furnish a signed guarantee, in form acceptable to the Engineer and Owner agreeing to repair or replace as decided by the Engineer, all work and materials that prove defective within one (1) year (or more) from the date of final acceptance, including restoration of all other work damaged in making such repairs or replacements.

        (8) Furnish Consent of Surety to final payment.

        (9) Submit updated final statement, accounting for final changes to Contract Sum.

        (10) Submit evidence of final, continuing insurance coverage complying with insurance requirements.

        (11) Certify that all Social Security, Unemployment and all other taxes (City, State, Federal Government) have been paid.

(12) Provide receipt, as applicable, of affidavits certifying all labor standards of local, State, or Federal requirements have been complied with by the Contractor.

(13) Submit actual DBE participation percentages.

11. Record Document Submittals
Specific requirements for record documents are shown in the section, PROJECT RECORD DOCUMENTS. Other requirements are indicated in the General Provisions. General submittal requirements are indicated in "Submittals" sections. Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Engineer's reference during normal working hours.

a. Record Drawings: The Engineer shall organize record drawing sheets into manageable sets, bind with durable paper cover sheets and print suitable titles, dates and other identification on the cover of each set.

b. Record Specifications: Upon completion of mark-ups, submit to the Engineer for the Owner's records.

c. Record Product Data: Upon completion of mark-ups, submit complete sets to the Engineer for the Owner's records.

d. Record Sample Submittal: Comply with the Engineer's instructions for packaging, identification, marking and delivery to the Owner's sample storage space.

e. Miscellaneous Record Submittals: Complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Engineer for the Owner's records.

f. Maintenance Manuals: Complete, place in order, properly identify and submit to the Engineer for the Owner's records.

12. Closeout Procedures
General Operating and Maintenance Instructions: Arrange for each installer of work requiring continuing maintenance or operation, to meet with the Owner's personnel at the project site to provide basic instructions needed for proper operation and maintenance of the entire work. Include instructions by manufacturer's representatives where installers are not expert in the required procedures. Review maintenance manuals, record documentation, tools, spare parts and materials, lubricants, fuel, identification system, control sequences, hazards, cleaning and similar procedures and facilities. For operational equipment, demonstrate start-up, shut-down, emergency operations, noise and vibration adjustments, safety, economy, efficiency adjustments, and similar operations. Review maintenance and operations in relation with applicable warranties, agreements to maintain bonds, and similar continuing commitments.

V. Final Cleaning

1. Provide final cleaning of the work, at the time indicated, consisting of cleaning each surface or unit of work to normal "clean" condition in a manner acceptable to the Engineer and Owner.

2. Removal of Protection: Remove temporary protection devices and facilities which were installed during the course of the work to protect previous completed work during the remainder of the construction period.

3. Compliances: Comply with safety standards and governing regulations for cleaning operations. Do not burn waste materials at site, bury debris or excess materials on the Owner's property. Do not discharge volatile or other harmful or dangerous materials into drainage systems. Remove waste materials from site and dispose of in a lawful manner.

Where extra materials of value remaining after the completion of the associated work have become the Owner's property, dispose of these as directed by the Owner.

END OF SP-2

SPECIAL PROVISION NO. 3
STAGING AND PHASING PROVISIONS FOR CONTRACTOR OPERATIONS

The Contractor shall prepare a written plan for his staging and phasing procedures in conformance with the Contract Drawings for all work. It shall be understood that the outline requirements presented are the minimum requirements. The Contractor is expected to provide added detailing as appropriate to fully inform the Project Manager of his/her intended method of operations and his/her schedules for proposed work.

The Engineer reserves the right to make changes to this plan to facilitate changes to the airport operations, which are in the best interest of the airport.

All costs associated with preparing the storage and staging area site shall be borne by the Contractor. This includes, but is not limited to, clearing and grading of the site, desired stabilization of the work yard surface, construction of any temporary utilities, access roads, all security fencing, etc.

END OF SP-3

SPECIAL PROVISION NO. 4

TIME OF COMPLETION AND LIQUIDATED DAMAGES

A. General

This project consists of several project elements, which are defined throughout the contract documents. The specific details pertaining to contract sequence and time are an important aspect of the project for planning of the various operational requirements of the airport. The Contractor shall be required to comply with the general intent of the phasing, scheduling and duration of the project as outlined in the contract documents or as otherwise approved by submittals allowed by the documents.

B. Construction Time

1. The construction plans and specifications set forth the time allocated to each of the elements of work required as part of this contract. The work shall be completed within the times established or as otherwise approved or liquidated damages in the amounts specified hereafter shall be assessed.

2. The Contractor must request and receive written approval from the Project Manager for acceptance of the work included in each of the phases or work prior to satisfying the requirements of being "complete."

3. The specified times for each of the project phases shall be outlined in these specifications or as otherwise agreed to in writing among the Owner, Project Manager and Contractor based upon the actual contract work awarded.

Substantial Completion contract time = **600 Calendar Days** (This is a calendar day contract);

Total contract time = **630 Calendar Days**

C. Construction Schedule

1. The Contractor shall prepare and submit a detailed schedule for his operations within the general limits and phasing restrictions included in the contract documents. This schedule shall be based upon the actual work ultimately awarded. This schedule shall be reviewed with the County, Project Manager and Contractor in order to establish the final approved schedule as it relates to this Special Provision.

D. Liquidated Damages

1. For this project, the rates for liquidated damages shall be One Thousand, Three Hundred and 00/100 dollars ($1,300.00) per calendar day.

END OF SP-4

SPECIAL PROVISION NO. 5

FEDERAL LABOR AND EEO PROVISIONS

1 LABOR PROVISIONS FOR CONTRACTS

1.1 Minimum Wages:

1.1.1. All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics, are considered wages paid to such laborers and mechanics, subject to the provisions of Paragraph A.(4) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in Paragraph 1.1.4 of this Special Provision. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: PROVIDED, that the Contractor's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under Paragraph 1.1.2 of this Special Provision) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its Subcontractors at the site of the Work in a prominent and accessible place where it can be easily seen by the workers. (29CFR5.5(a)(1)(i))

1.1.2. The contracting officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the Contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(a) The Work to be performed by the classification requested is not performed by a classification in the wage determination; and

(b) The classification is utilized in the area by the construction industry; and

(c) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

1.1.3. If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 30320. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

1.1.4. In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

The wage rate (including fringe benefits where appropriate) determined pursuant to Paragraphs 1.1.3 and 1.1.4 of this Special Provision, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification. (29CFR5.5(a)(1)(ii))

1.1.5. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof. (29CFR5.5(a)(1)(iii))

1.1.6. If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, PROVIDED, that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (29CFR5.5(a)(1)(iv))

1.2 Withholding:

1.2.1. The Federal Aviation Administration (FAA) shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contractor subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any Subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentices, trainees and helpers, employed by the Contractor or any Subcontractor the full amount of wages required by the Contract, or in the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or

helper employed or working on the site of the Work (or under the United States Housing Act of 1937 or under the Housing Act of 1949) on the construction or development of the Project), all or part of the wages required by the Contract, the FAA may, after written notice to the Contractor, sponsor, applicant or Owner, take such action as may be necessary to cause the suspension of any further payment, advance or guarantee of funds until such violations have ceased. (29CFR5.5(a)(2))

1.3 Payroll and Basic Records:

1.3.1. Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (29CFR5.5(a)(3)(i))

1.3.2. The Contractor shall submit weekly for each week in which any Contract Work is performed a copy of all payrolls to the FAA if the FAA is a party to the Contract. The Contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the FAA. The payrolls submitted shall set out accurately and completely all of the information required to be contract, but if the agency is not such a party, then maintained under Paragraph 5.5(a)(3)(i) of Regulations 29 CFR Part 5. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or its agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(a) That the payroll for the payroll period contains the information required to be maintained under Paragraph 5.5(a)(3)(i) of the Regulations, 29 CFR Part 5 and that such information is correct and complete.

(b) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR Part 3.

(c) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph C.(2)(b) of this section.

The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code. (29CFR5.5(a)(3)(ii))

1.3.3. The contractor or subcontractor shall make the records required under Paragraph 1.3.1 of this section available for inspection, copying, or transcription by authorized representatives of the FAA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12. (29CFR5.5(a)(3)(iii))

1.4 Apprentices and Trainees:

1.4.1. **Apprentices.** Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified

in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate acceptable program is approved. (29CFR5.5(a)(4)(i))

1.4.2. **Trainees.** Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U. S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid in full benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved. (29CFR5.5(a)(4)(ii))

1.4.3. **Equal Employment Opportunity.** The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30. (29CFR5.5(a)(4)(iii))

1.5 **Compliance with Copeland Act Requirements:** The contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract. (29CFR5.5(a)(5))

1.6 **Subcontractors:** The contractor or subcontractor shall insert in any subcontracts the clauses contained in Paragraphs 1.1 through 1.10 of this Special Provision [29CFR5.5(a)(1) through (10)] and such other clauses as the Federal Aviation Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier

subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5. (29CFR5.5(a)(6))

1.7 Contract Termination: Debarment: A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12. (29CFR5.5(a)(7))

1.8 Compliance with Davis-Bacon and Related Act Requirements: All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1,3 and 5 are herein incorporated by reference in this contract. (29CFR5.5(a)(8))

1.9 **Disputes Concerning Labor Standards:** Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6 and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U. S. Department of Labor, or the employees or their representatives. (29CFR5.5(a)(9))

1.10 Certification of Eligibility:

1.10.1. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

1.10.2. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act CFR 5.12(a)(1).

1.10.3. The penalty for making false statements is prescribed in the U. S. Criminal Code, 18 U.S.C. 1001. (29CFR5.5(a)(10))

1.11 **Contract Work Hours and Safety Standards Act:** (29CFR5.5(b))

1.11.1. **Overtime requirements.** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

1.11.2. **Violation; liability for unpaid wages; liquidated damages.** In the event of any violation of the clause set forth in Paragraph 1.11.1 of this Special Provision, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph (1) of this paragraph, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in Paragraph 1.11.1 of this Special Provision.

1.11.3. **Withholding for unpaid wages and liquidated damages.** The Federal Aviation Administration shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clauses set forth in Paragraph 1.11.2 of this Special Provision.

1.11.4. **Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in Paragraphs 1.11.1 through 1.11.4 of this Special Provision and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in Paragraphs 1.11.1 through 1.11.4 of this Special Provision.

2 VETERANS PREFERENCE

2.1 In the employment of labor (except in executive, administrative and supervisory positions), the Contractor shall give preference to veterans of the Vietnam era and disabled veterans as defined in Section 515(c)(1) and (2) of the Airport and Airway Improvement Act of 1982.

3 GENERAL WAGE DECISION

3.1 A copy of the current Davis-Bacon Wage Determination applicable to the Project is provided as follows:

Davis-Bacon Wage Rates
(General Decision County Index Date)

"General Decision Number: FL20210102 01/01/2021

Superseded General Decision Number: FL20200102

State: Florida

Construction Type: Heavy

Counties: Franklin, Gulf, Liberty and Walton Counties in
Florida.

HEAVY CONSTRUCTION PROJECTS (Including Sewer and Water Lines)

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015.

If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number Publication Date
0 01/01/2021

* PAIN0164-005 08/01/2020

	Rates	Fringes
PAINTER: Brush and Spray	$ 20.21	11.83

SUFL2009-141 06/24/2009

	Rates	Fringes
LABORER: Common or General	$ 8.46	0.00
LABORER: Pipelayer	$ 12.63	1.49
OPERATOR: Backhoe/Excavator	$ 10.50	1.33
OPERATOR: Bulldozer	$ 13.30	1.92
OPERATOR: Loader	$ 11.00	0.00
TRUCK DRIVER, Includes 4 Axle, Distributor, Dump, Lowboy and Tandem Trucks	$ 9.89	0.00

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide

employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

"General Decision Number: FL20210151 01/01/2021

Superseded General Decision Number: FL20200151

State: Florida

Construction Type: Highway

County: Walton County in Florida.

HIGHWAY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number Publication Date
0 01/01/2021

* ELEC0349-002 09/01/2020

	Rates	Fringes
ELECTRICIAN	$ 36.36	11.82

SUFL2013-012 08/19/2013

	Rates	Fringes
CARPENTER, Includes Form Work	$ 12.77	0.00
CEMENT MASON/CONCRETE FINISHER	$ 12.40	0.00
HIGHWAY/PARKING LOT STRIPING: Operator (Striping Machine)	$ 12.89	0.00
IRONWORKER, REINFORCING	$ 13.86	0.00
LABORER (Traffic Control Specialist)	$ 11.40	0.00
LABORER: Asphalt, Includes Raker, Shoveler, Spreader and Distributor	$ 10.79	0.00
LABORER: Common or General	$ 9.75	0.00
LABORER: Flagger	$ 9.91	0.00
LABORER: Grade Checker	$ 11.16	0.00
LABORER: Landscape & Irrigation	$ 9.13	0.00
LABORER: Pipelayer	$ 11.66	0.00
OPERATOR: Backhoe/Excavator/Trackhoe	$ 12.34	0.00
OPERATOR: Bobcat/Skid Steer/Skid Loader	$ 11.60	0.00
OPERATOR: Broom/Sweeper	$ 10.90	0.00
OPERATOR: Bulldozer	$ 12.92	0.00
OPERATOR: Crane	$ 17.83	0.00

OPERATOR: Distributor.....$ 12.71 0.00

OPERATOR: Forklift.....$ 11.14 0.00

OPERATOR: Grader/Blade.....$ 13.88 0.00

OPERATOR: Loader.....$ 11.66 0.00

OPERATOR: Mechanic.....$ 12.37 0.00

OPERATOR: Milling Machine.....$ 13.10 0.00

OPERATOR: Oiler.....$ 11.38 0.00

OPERATOR: Paver (Asphalt,
Aggregate, and Concrete).....$ 13.96 0.00

OPERATOR: Post Driver
(Guardrail/Fences).....$ 16.00 0.00

OPERATOR: Roller.....$ 10.44 0.00

OPERATOR: Screed.....$ 13.49 0.00

OPERATOR: Tractor.....$ 11.00 0.00

OPERATOR: Trencher.....$ 16.00 0.00

TRUCK DRIVER: Dump Truck.....$ 10.97 0.00

TRUCK DRIVER: Lowboy Truck.....$ 14.13 0.00

TRUCK DRIVER: Water Truck.....$ 12.04 0.00

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who

is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the

wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board

U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

4 EQUAL EMPLOYMENT REQUIREMENTS

4.1 Requirement for Certification of Nonsegregated Facilities:

4.1.1. Notice to Prospective Construction Contractors:

(a) The Certification of Non-segregated Facilities contained in the Bid Documents must be submitted with the Bid for a construction contract exceeding Ten Thousand Dollars ($10,000.00) which is not exempt from the provisions of the Equal Opportunity Clause.

(b) Contractors receiving contract awards exceeding Ten Thousand Dollars ($10,000.00) which are not exempt from the provisions of the forwarding of this notice to prospective subcontractors for supplies and construction contracts where the subcontracts exceed Ten Thousand Dollars ($10,000.00) and are not exempt from the provisions of the Equal Opportunity Clause.

4.1.2. Notice to Prospective Subcontractors of Requirement for Certification of Non-segregated Facilities:

(a) A Certification of Non-segregated Facilities must be submitted prior to the award of a subcontract exceeding Ten Thousand Dollars ($10,000.00) which is not exempt from the provisions of the Equal Opportunity Clause.

(b) The Certification of Non-segregated Facilities Form is located in the Bid Package of the Contract Documents.

4.2 Standard Federal Equal Employment Construction Contract Specifications (Executive Order 11246, as amended):

4.2.1. As used in these specifications:

(a) "Covered area" means the geographical area described in the solicitation from which this contract resulted;

(b) "Director" means Director, Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, or any person to whom the Director delegates authority;

(c) "Employer identification number" means the federal social security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941;

(d) "Minorities" includes:

(1) Black (all persons having origins in any of the black African racial groups not of Hispanic origin);

(2) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish culture or origin regardless of race);

(3) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

(4) American Indian or Alaskan native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

4.2.2. Whenever the Contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of Ten Thousand Dollars ($10,000.00) the provisions of these specifications and the notice which contains the applicable goals for minority and women participation and which is set forth in the solicitations from which this contract resulted.

4.2.3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the plan area (including goals and timetables) shall be in accordance with that plan for those trades which have unions participating in the plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause and to make a good faith effort to achieve each goal under the plan in each trade which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the plan goals and timetables.

4.2.4. The Contractor shall implement the specific affirmative action standards provided in Paragraphs 4.2.7.1 through 4.2.7.16 of this Special Provision. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and women utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in geographical areas where they do not have a federal or federally assisted construction contract shall apply the minority and women goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Federal Contract Compliance Programs office or from Federal Procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

4.2.5. Neither the provisions of any collective bargaining agreement nor the failure by a union with whom the Contractor has a collective bargaining agreement to refer either minorities

or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, as amended, or the regulations promulgated pursuant thereto.

4.2.6. In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

4.2.7. The Contractor shall take specific affirmative actions to ensure EEO. The evaluation of the Contractor's compliance with these specifications shall be based upon its efforts to achieve maximum results from its actions. The Contractor shall document these efforts fully and shall implement affirmative action steps at least as extensive as the following:

1. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minorities or women individuals working at such sites or in such facilities.

2. Establish and maintain a current list of minority and women recruitment sources, provide written notification to minority and women recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organization's responses.

3. Maintain a current file of the names, addresses and telephone numbers of each minority and women off-the-street applicant and minority or women referral from a union, a recruitment source, a community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefore along with whatever additional actions the Contractor may have taken.

4. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

5. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly includes minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the

Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under Paragraph 4.2.7.2 of this Special Provision.

6. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and women employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

7. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with on-site supervisory personnel such as superintendents, general foremen, etc., prior to the initiation of construction work at any jobsite. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

8. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and women news media, and providing written notification to and discussing the Contractor's EEO policy with other contractors and subcontractors with whom the Contractor does or anticipates doing business.

9. Direct its recruitment efforts, both oral and written, to minority, women and community organizations, to schools with minority and women students; and to minority and women recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one (1) month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations, such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

10. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and women youth, both on the site and in other areas of a contractor's work force.

11. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

12. Conduct, at least annually, an inventory and evaluation, at least of all minority and women personnel, for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

13. Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

14. Ensure that all facilities and company activities are non-segregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

15. Document and maintain a record of all solicitations of offers for subcontractors from minority and women construction contractors and suppliers, including circulation of solicitations to minority and women contractor associations and other business associations.

16. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

4.2.8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (Paragraphs 4.2.7 through 4.2.7.16 of this Special Provision). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar groups of which the Contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under Paragraphs 4.2.7 through 4.2.7.16 of this Special Provision of these specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female work force participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's--failure of such a group to fulfill an obligation shall not be a defense for the Contractor's non-compliance.

4.2.9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide EEO and to make affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goal for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is under-utilized).

4.2.10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex or national origin.

4.2.11. The Contractor shall not enter into any subcontract with any person or firm debarred from government contracts pursuant to Executive Order 11246, as amended.

4.2.12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination, and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive

Order 11246, as amended, and its implementing regulations, by the OFCCP. Any contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

4.2.13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in Paragraph 4.2.7 of this Special Provision, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

4.2.14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the government, and to keep records. Records shall at least include for each employee, the name, address, telephone number, construction trade, union affiliation, if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

4.2.15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Grant Program).

4.3 Contractor Contractual Requirements:

During the performance of this contract, the Contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "Contractor") agrees as follows:

4.3.1. Compliance with Regulations: The Contractor shall comply with the Regulations relative to non-discrimination in federally assisted programs of the Department of Transportation (hereinafter, "DOT") Title 49, Code of Federal Regulations, Part 21, as they may be amended from time-to-time (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this Contract.

4.3.2. Non-discrimination: The Contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Contractor shall not participate either directly or indirectly in the discrimination prohibited by Section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.

4.3.3. Solicitations for Subcontracts, including Procurement of Materials and Equipment: In all solicitations either by competitive bidding or negotiation made by the Contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the Contractor of

the Contractor's obligation under this Contract and the Regulations relative to non-discrimination on the grounds of race, color or national origin.

4.3.4. Information and Reports: The Contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the sponsor or the Federal Aviation Administration (FAA) to be pertinent to ascertain compliance with such regulations, orders and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to the sponsor or the FAA, as appropriate, and shall set forth what efforts it has made to obtain the information.

4.3.5. Sanctions for Non-compliance: In the event of the Contractor's non-compliance with the non-discrimination provisions of this contract, the sponsor shall impose such contract sanctions as it or the FAA may determine to be appropriate, including but not limited to:

1. Withholding of payments to the Contractor under the Contract until the Contractor complies, and/or

2. Cancellation, termination or suspension of the Contract, in whole or in part.

4.3.6. Incorporation of Provisions: The Contractor shall include the provisions of Paragraphs 4.2 through 4.7 of this Special Provision in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations or directives issued pursuant thereto. The Contractor shall take such action with respect to any subcontract or procurement as the sponsor or the FAA may direct as a means of enforcing such provisions including, sanctions for non-compliance. Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a Subcontractor or supplier as a result of such direction, the Contractor may request the sponsor to enter into such litigation to protect the interests of the sponsor and, in addition, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

4.4 Equal Employment Opportunity Clause:

During the performance of this Contract the Contractor agrees as follows:

4.4.1. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin. The Contractor will take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination, rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places available to employees and applicants for employment, notices (see Paragraph 15.4) setting forth the provisions of this nondiscrimination clause.

4.4.2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

4.4.3. The contractor will send, to each labor union or representative of workers with which he had a collective bargaining agreement or other contract or understanding, a notice (see Section 4.5) advising that said labor union or workers' representatives of the contractor's commitments under this section and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

4.4.4. The contractor will comply with all provisions of Executive Order 11246, as amended, of September 24, 1965, and of the rules, regulations and relevant orders of the Secretary of Labor.

4.4.5. The contractor will furnish all information and reports required by Executive Order 11246, as amended, of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the FAA and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations and orders.

4.4.6. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract of with any of the said rules, regulations, or orders, this contract may be canceled; terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246, as amended, of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246, as amended, of September 24,.1965, or by rule, regulation, or order of the Secretary of State, or as otherwise provided by law.

4.4.7. The contractor will include the portion of the sentence immediately preceding paragraph 1 and the provisions of paragraphs 1 through 7 in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246, as amended, of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontractor of purchase order as the FAA may direct as a means of enforcing such provisions, including sanctions for noncompliance: provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the FAA, the contractor may request the United States to enter into such litigation to protect the interests 'of the United States.

4.5 Notices to be Posted:

The "Equal Employment Opportunity is the Law" poster is to be posted by the Contractor in a conspicuous place available to employees and applicants for employment as required by Paragraphs 4.2 and 4.4 of this Special Provision of the EEO Clause. Copies of this poster will be furnished to contractors at the pre-construction conference.

4.6 Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246), as Amended:

4.6.1. The Contractor's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

4.6.2. The goals and timetables for minority and women participation, expressed in percentage terms for the Contractor's aggregate work force in each trade on all construction work in the covered area are as follows:

Timetables:

These goals are applicable to all the Contractor's construction work (whether or not it is federal or federally assisted) performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its federally involved and non-federally involved construction.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals. The hours of minority and women employment and training must be substantially uniform throughout the length of the Contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from contractor-to-contractor or from project-to-project, for the sole purpose of meeting the Contractor's goals, shall be a violation of the Contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

4.6.3. The Contractor shall provide written notification to the Director, OFCCP, within ten (10) working days of award of any construction subcontract in excess of Ten Thousand Dollars ($10,000.00) at any tier of construction work under the Contract resulting from this solicitation. The notification shall list the name, address, telephone number of the Subcontractor; employer identification number of the Subcontractor; estimated dollar amount of the subcontracts; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.

4.7 Required Reports:

4.7.1. **Annual EEO-1 Report:** Contractors/Subcontractors working on federally assisted airport construction projects are required to file annually, on or before March 31st, complete and accurate reports on Standard Form 100 (Employee Information Report, EEO-1). The first such report is required within thirty (30) days after award unless the Contractor/Subcontractor has submitted such a report within twelve (12) months preceding the date of award (the FAA or Department of Labor OFCCP can designate other intervals). This form is normally furnished based on a mailing list, but can be obtained from the Joint Reporting Committee, 1800 G Street, N.W., Washington, D.C. 20506. This report is required if a contractor or subcontractor meets all of the following conditions:

1. Non-exempt: Contractors/subcontractors are not exempt based on 41 CFR 60-1.5, and

2. Number of Employees: Has fifty (50) or more employees, and

3. Contractor/Subcontractor: Is a prime contractor or first tier subcontractor, and

4. Dollar Level: There is a contract, subcontract or purchase order amounting to Fifty Thousand Dollars ($50,000.00) or more, or serves as a depository of government funds in any amount, or is a financial institution which is an issuing and paying agent for U.S. savings bonds and savings notes. Some subcontractors below the first tier who work at the site are required to file if they meet the requirements of 41 CFR 60-1.7.

4.7.2. **Records:** The FAA or Department of Labor OFCCP may require a contractor to keep employment or other records and to furnish, in the form requested within reasonable limits, such information as necessary.

4.8 MBE Required Statements

4.8.1. **Policy.** It is the policy of the Department of Transportation that minority business enterprises as defined in 49 CFR Part 26 shall have the maximum opportunity to participate in the performance of contracts financed in whole or in part with Federal funds under this agreement. Consequently, the MBE requirements of 49 CFR Part 26 apply to this agreement.

4.8.2. **MBE Obligation.** The recipient or its contractor agrees to ensure that minority business enterprises as defined in 49 CFR Part 26 have the maximum opportunity to participate in the performance of contracts financed in whole or in part with Federal funds provided under this agreement. In this regard all recipients or contractors shall take all necessary and reasonable steps in accordance with 49 CFR Part 26 to ensure that minority business enterprises have the maximum opportunity to compete for and perform contracts. Recipients and their contractors shall not discriminate on the basis of race, color, national origin, or sex In the award and performance of DOT-assisted contracts.

5 Contract Assurance Required by 49 CFR Part 26

The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the owner deems appropriate.

END OF SPECIAL PROVISION NO. 5

SPECIAL PROVISION NO. 6

E-VERIFY REQUIREMENTS

The Contractor and all sub-contractors shall be in compliance with Florida State Executive Order Number 11-02. The Contractor shall provide a certification to the Owner stating that they are in compliance with this order.

END OF SPECIAL PROVISION NO. 6

SPECIAL PROVISION NO. 7

MISCELLANEOUS FEDERAL AND STATE CONTRACT PROVISIONS

1.0 AGREEMENTS WITH THE UNITED STATES AND STATE OF FLORIDA

This Contract shall be subject to all restrictions of record affecting the Airport and the use thereof, all Federal and state laws and regulations affecting the same, and shall be subject and subordinate to the provisions of any existing agreement between the Owner and the United States of America or the State of Florida, their boards, members, agencies or commissions and to future agreements between the foregoing relative to the operation or maintenance of the Airport, the execution of which may be required as a condition precedent to the expenditure of Federal or state funds for the development of the Airport, or as a condition precedent to the use of the Airport, or any part thereof, by the Contractor, the Owner or otherwise. All provisions hereof shall be subordinate to the right of the United States of America to terminate the right of the Contractor, the Owner, or others, to occupy or to use the Airport, or any part thereof, during the time of war or national emergency.

2.0 COVENANTS AGAINST DISCRIMINATION

The Contractor, for itself, its successors in interest and assigns, as part of the consideration hereof, does hereby covenant and agree as a covenant running with the land that (1) no person on the grounds of race, color, religion, sex, age, physical handicap or national origin shall be excluded from participation in, denied the benefit of, or be otherwise subjected to discrimination in the use of the Airport under the provisions of this Agreement; (2) that in the construction of any improvements on, over or under the Airport and the furnishing of services thereon, no person shall be excluded from participation in, denied the benefits of, or otherwise be subjected to discrimination on the above-stated grounds; (3) that the Contractor shall use the Airport property in compliance with all other requirements imposed by or pursuant to state law or Title 49, Code of Federal Regulations, Department of Transportation - effectuation of Title VI of the Civil Rights Act of 1964, and as said Regulations may be amended. Should the Contractor authorize another person, with the Owner's prior written consent, to provide services or benefits upon the Airport property, the Contractor shall obtain from such person a written agreement pursuant to which such person shall, with respect to the services or benefits which it is authorized to provide, undertake for itself the obligations contained in this Subparagraph. The Contractor shall furnish the original of such Agreement to the Owner.

In the event of breach of any of the above non-discrimination covenants, the Owner shall have the right to terminate this Agreement. The right granted to the Owner by the foregoing sentence shall not be effective until the procedures of Title 49, Code of Federal Regulations, Part 21, if applicable, are followed and completed, including exercise or expiration of appeal rights.

The Owner may from time to time be required by the United States Government, its agencies, or the State of Florida to adopt additional or amended provisions including non-discrimination provisions, concerning the use and operation of the Airport, and the Contractor agrees that it will adopt any such requirement as a part of this Agreement.

If the Contractor shall furnish any services to the public at the Airport, it shall furnish said services on a fair, equal and not unjustly discriminatory basis to all users thereof and shall charge fair, reasonable and not unjustly discriminatory prices for each unit of service, provided that the Contractor shall be allowed to make reasonable and non-discriminatory discounts or rebates or other similar types of price reductions to volume purchasers, if any.

3.0 FAA APPROVAL REQUIRED

3.1 This Contract is subject to approval by the FAA. The Owner shall use its best efforts to obtain FAA approval. If the FAA requires any modifications to the Contract Documents as a condition of granting approval, and the Contractor fails to consent to the required modifications, then the Contract shall be void and the Owner shall have no liability to the Contractor.

3.2 If after initial approval by the FAA has been obtained, the FAA or its successor requires any modifications in this Contract as a condition of granting funds for the improvement of the Airport, the Contractor hereby consents to those modifications, which shall be accomplished in accordance with the General Provisions, Section 40-02, Alteration of Work and Quantities.

4.0 FEDERAL AND STATE AID PARTICIPATION

4.1 For AIP (Federal Aid) contracts, the United States Government has agreed to reimburse the Owner for some portion of the contract costs. Such reimbursement is made from time to time upon the Owner's request to the FAA. In consideration of the United States Government's (FAA's) agreement with the Owner, the Owner has included provisions in this Contract pursuant to the requirements of the Airport and Airway Improvement Act of 1982 (96 Stat. 671), as amended, and the Rules and Regulations of the FAA that pertain to the Work.

4.2 As required by the Act, the Work is subject to inspection and approval of duly authorized representatives of the Administrator of the FAA and is further subject to those provisions of the rules and regulations that are cited in the Contract Documents.

4.3 No requirements of the Act, the rules and regulations implementing the Act, or this Contract shall be construed as making the Federal Government a party to the Contract nor will any such requirement interfere, in any way, with the rights of either party to the Contract.

5.0 INSPECTION BY OTHERS

Pursuant to a Joint Participation Agreement between the State of Florida Department of Transportation and the Owner, the State of Florida may pay a portion of the costs of this improvement. The construction work and labor shall be done in accordance with the laws affecting and regulations of the State of Florida Department of Transportation. The construction work and materials, therefore, will be subject to inspection by the State of Florida Department of Transportation or its agents as it or they may deem necessary; provided, however, that such inspections shall not be construed so as to make the State of Florida Department of Transportation a party to this Contract and shall not interfere with the performance of the obligations of any party to this Contract.

6.0 ENVIRONMENTAL PROTECTION

6.1 For all construction contracts and subcontracts exceeding One Hundred Thousand Dollars ($100,000.00) where Federal Aid is involved, the Contractor and its subcontractors represent and covenant that:

6.1.1 Any facility to be used in the performance of the Contract or to benefit from the Contract is not listed on the Environmental Protection Agency (EPA) List of Violating Facilities.

6.1.2 They comply and will comply with all requirements of Section 306 of the Clean Air Act (42 USC 1857(h)), Section 508 of the Clean Water Act (33 USC 1368), Executive Order 11738, environmental protection regulations (40 CFR Part 15) and all regulations issued thereunder.

6.1.3 As a condition for award of a contract, it will notify the awarding official of the receipt of any communication from the EPA indicating that a facility to be utilized for performance of or benefit from the contract is under consideration to be listed on the EPA List of Violating Facilities.

6.1.4 They will include or cause to be included in any contract or subcontract which exceeds One Hundred Thousand Dollars ($100,000.00) the aforementioned criteria and requirements.

7.0 ARCHAEOLOGICAL AND HISTORICAL FINDINGS

Unless otherwise specified in the Contract Documents, the Contractor is advised that the site of the work is not within any property, district or site, and does not contain any building, structure or object listed in the current National Register of Historic Places published by the United States Department of the Interior.

Should the Contractor encounter, during its operations, any building, part of a building, structure, or object which is incongruous with its surroundings, the Contractor shall immediately cease operations in that location and notify the Engineer. The Engineer will investigate the Contractor's finding and will direct the Contractor to either resume or suspend operations.

8.0 RESTRICTIONS ON USE OF FOREIGN FIRMS AND PRODUCTS

8.1 The Contractor or Subcontractor, by submission of an offer and/or execution of a contract, certifies that it:

8.1.1 is not owned or controlled by one or more citizens or nationals of a foreign country included in the list of countries that discriminate against U.S. firms published by the Office of the United States Trade Representative (USTR);

8.1.2 has not knowingly entered into any contract or subcontract for this project with a contractor that is a citizen or national of a foreign country on said list, or is owned or is controlled directly or indirectly by one or more citizens or nationals of a foreign country on said list;

8.1.3 has not procured any product nor subcontracted for the supply of any product for use on the project that is produced in a foreign country on said list.

8.2 Unless the restrictions of this clause are waived by the Secretary of Transportation in accordance with 49 CFR 30.17, no contract shall be awarded to a contractor or subcontractor who is unable to certify to the above. If the contractor knowingly procures or subcontracts for the supply of any product or service of a foreign country on the said list for use on the project, the Federal Aviation Administration may direct, through the sponsor, cancellation of the contract at no cost to the Government.

8.3 Further, the Contractor agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification without modification in each contract and in all lower tier subcontracts. The Contractor may rely upon the certification of a prospective subcontractor unless it has knowledge that the certification is erroneous.

8.4 The Contractor shall provide immediate written notice to the sponsor if the Contractor learns that its certification or that of a Subcontractor was erroneous when submitted or has become erroneous by reason of changed circumstances. The Subcontractor agrees to provide immediate written notice to the Contractor, if at any time it learns that its certification was erroneous by reason of changed circumstances.

8.5 This certification is a material representation of fact upon which reliance was placed when making the award. If it is later determined that the contractor or subcontractor knowingly rendered an erroneous certification, the Federal Aviation Administration may direct, through the sponsor, cancellation of the contract or subcontract for default at no cost to the Government.

8.6 Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by this provision. The knowledge and information of a contractor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

8.7 This certification concerns a matter within the jurisdiction of an agency of the United States of America and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code, Section 1001.

8.8 The following countries are listed by the Office of the United States Trade Representative as countries which discriminate against U.S. firms: None

9.0 CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

The Contractor certifies, by acceptance and execution of this contract, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared in eligible or voluntarily excluded from participation in this transaction by any Federal department or agency. It further agrees by executing and accepting this contract that it will include this clause without modification in all lower tier transactions, solicitations, proposals, contracts and subcontracts. Where the contractor or any lower tier participants is unable to certify to this statement, it shall provide the Owner with an explanation prior to the execution of this contract or the contractor's contracts and subcontracts with lower tier participants.

10.0 BUY AMERICAN REQUIREMENTS: STEEL & MANUFACTURED PRODUCTS

10.1 The Contractor agrees that only domestic steel and manufactured products will be used by the Contractor, Subcontractors, materialmen and Suppliers in the performance of this Contract, as defined in Paragraph 10.2 below:

10.2 The following terms apply to this clause:

1. Steel and manufactured products. As used in this clause, steel and manufactured products include (1) those produced in the United States or (2) a manufactured product produced in the United States, if the cost of its components mined, produced or manufactured in the United States exceeds 60 percent of the cost of all its components and final assembly has taken place in the United States.

2. Components. As used in this clause, “components” means those articles, materials and supplies incorporated directly into the steel and manufactured products.

3. Cost of Components. This means the cost for production of the components, exclusive of final assembly costs.

END OF SPECIAL PROVISION NO. 7

TECHNICAL SPECIFICATIONS

BID DOCUMENTS

DFS TERMINAL, HANGAR, AND APRON EXPANSION
DEFUNIAK SPRINGS AIRPORT

SECTION 01070 - ABBREVIATIONS AND SYMBOLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section

1.2 DESCRIPTION:

A. Abbreviations that may be used in the Contract Documents including the drawings are listed in this section and have the identifications and meanings shown herein except where otherwise indicated.

B. Symbols are identified on the drawings.

C. Related requirements in other parts of the Contract Documents.

1) Drawing symbols: Contract drawings
2) Drawing abbreviations: Contract drawings.

1.3 ABBREVIATIONS:

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AF	Air Force
AGCA	Associated General Contractors of America
AI	Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANG	Air National Guard
ANSI	American National Standard Institute
API	American Petroleum Institute
AREA	American Railway Engineering Association
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association
AWG	American Wire Gage
AWS	American Welding Society
AWWA	American Water Works Association
COE	Corps of Engineers
CRSI	Concrete Reinforcing Steel Institute
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FS	Federal Specifications
MUTCD	Manual on Uniform Traffic Control Devices For Streets and Highways
NEMA	National Electrical Manufacturers Association
NEC	National Electrical Code

NWS	National Weather Service
OSHA	Occupational Safety and Health Act
PCA	Portland Cement Association
UL	Underwriter's Laboratories, Inc.
DHPT	Department of Highways and Public Transportation
DOT	Department of Transportation
HD	Highway Department

1.4 DRAWING ABBREVIATIONS:

A. The following list is not necessarily all-inclusive; additional abbreviations may be used and defined on the drawings.

B. Some abbreviations used on the drawings may not have the same meaning as that identified in the following list; the non-conforming meanings are identified on the drawings when not self-evident.

C. Some variation in use of periods and capitalization may be found on the drawings.

ABBRV	MEANING
AB	Anchor Bolt
ABT	About
ABV	Above
AC	Advisory Circular (FAA)
AC	Alternating current
AC	Asphaltic concrete
ACFT	Aircraft
ADDN	Addition
AF	Air Force
AGG	Aggregate
AIP	Airport Improvement
ATC	Air traffic control
ATCT	Air traffic control tower
AVE	Avenue
AVG	Average
CULV	Culvert
AWOS	Automatic weather observing systems
D	Depth
DAT	Datum
DBL	Double
BF	Both faces
BLDG	Building
BL	Base line
BM	Bench mark
DEF.ANG.	Deflection angle
DEG	Degree
BRK	Brick
BS	Both sides
BTW	Between

ABBRV	MEANING
ALIGN	Alignment
ALP	Airport layout plan
ALS	Approach lighting system
ALT	Alternate
ANT	Antenna
AOA	Air operational area
AP	Airport
APPROX	Approximate
ARCH	Architecture
ARP	Airport reference point
ASPH	Asphalt Program
CPP	Corrugated polyethylene pipe
CPS	Cycles per second
CTB	Cement treated base course
AWG	American wire gage
CY	Cubic yard
B TO B	Back to back
BCN	Beacon
BDY	Boundary
BET	Between
BIT	Bituminous
DBST	Double bituminous surface treatment
DC	Direct current
BOT	Bottom
BRL	Building restriction line
DEMO	Demolish
DI	Drop inlet
DIA	Diameter
BW	Both ways

ABBRV	MEANING
DIP	Ductile iron pipe
DIR	Direction
C	Centigrade
C TO C	Center to center
CA	Cable
CB	Catch basin
DWG	Drawing
CD	Check dam
EA	Each
EF	Each face
EJ	Expansion joint
CFS	Cubic feet per second
ENGR	Engineer
CHK	Check
CIP	Cast iron pipe
CL	Clear
CLR	Clearance
CO	Cleanout
CONST	Construction
CORR	Corrugate
EQ	Equal
EQUIV	Equivalent
EW	Each way
EXIST	Existing
ILS	Instrument landing system
F TO F	Face to face
FAR	Federal Aviation Regulation
FDN	Foundation
FG	Finish grade
FIG	Figure
FLD	Field
FPM	Feet per minute
FS	Federal Specification
FTG	Footing
FWD	Forward
GAL	Gallon
GEN	General
GOVT	Government
GPS	Gallons per second
GV	Gate valve
HP	High point
HGT	Height
HIRL	High intensity runway lights
HOR	Horizontal
ID	Inside diameter
IFR	Instrument flight rule
INCL	Include

ABBRV	MEANING
DIM.	Dimension
DIST	Distant
DIV	Division
DO	Ditto
DSGN	Design
DTD	Dated
CBM	Construction benchmark
CEM	Cement
CFM	Cubic feet per minute
EG	For example
EL	Elevation
CHAM	Chamfer
CHG	Change
CI	Cast iron
CJ	Construction joint
C/L	Center line
CMP	Corrugated metal pipe
CONC	Concrete
CONT	Continue
EOP	Edge of pavement
EQUIP	Equipment
EST	Estimate
EXC	Excavate
EXT	Exterior
F	Fahrenheit
FAB	Fabricate
FBO	Fixed base operator
FF	Finish floor
FH	Fire hydrant
FIN	Finish
FOD	Foreign object damage
FPS	Feet per second
FT	Foot or feet
FW	Fresh water
GA	Gage or Gauge
GALV	Galvanize
GFE	Government-furnished equipment
GPM	Gallons per minute
GRD	Ground or grade
GVGI	Generic visual glide slope indicator
HGR	Hangar
HH	Hand hole
HMAC	Hot mix asphaltic concrete
HWY	Highway
IDENT	Identification
IN.	Inch
INT	Intersect

ABBRV	MEANING
INV	Invert
IP	Iron pipe
JFR	Jet fuel resistant
JT	Joint
KWY	Keyway
LAT	Latitude
LC	Length of curve
LG	Length or long
LIRL	Low intensity runway lights
LOA	Length over-all
LONG	Longitudinal
LS	Lump sum
LVC	Length of vertical curve
MALS	Medium intensity approach lighting system
MAX	Maximum
MHW	Mean high water
PVI	Point of vertical intersection
MITL	Medium intensity taxiway lights
MLS	Microwave landing system
MON	Monument
MTL	Metal
NAVAID	Navigational aid
NO	Number
NOTAM	Notice to airmen
OA	Over-all
OD	Outside diameter
OPS	Operations
PAPI	Precision approach path indicator
PAV'T	Pavement
PCC	Portland cement concrete
PI	Point of intersection
PJF	Premolded joint filler
PL	Plate
PROJ	Project
PSI	Pounds per square inch
PT	Point of tangency
PVC	Point of vertical curve
PVMT	Pavement
QC	Quality control
R	Radius
RW	Runway
RCP	Reinforced concrete pipe
REF	Reference
REINF	Reinforce

ABBRV	MEANING
IP	Inlet protection
JB	Junction Box
JMF	Job mix formula
K	Kip (1,000 lb)
L	Left
LB	Pound
LF	Linear feet
LIN	Linear
LITL	Low intensity taxiway lights
LOC	Localizer
LP	Low point
LT	Light
MAINT	Maintenance
MATL	Material
MH	Manhole
MIN	Minimum
MIRL	Medium intensity runway lights
MISC	Miscellaneous
MLW	Mean low water
MSL	Mean sea level
NATL	National
NIC	Not in contract
NOM	Nominal
NTS	Not to scale
OC	On center
OFZ	Obstacle free zone
ORIG	Original
PAR	Precision approach radar
PC	Point of curve
PFC	Porous friction course
PIV	Post indicator valve
POL	Petroleum fuel, oil, and/or lubricants
PREP	Prepare
PROP	Proposed
PT	Point
PVC	Polyvinyl chloride
PVT	Point of vertical tangency
QA	Quality assurance
R	Right
RAIL	Runway alignment indicator lights
RC	Reinforced concrete
RD	Road
REIL	Runway end identifier lights
RELOC	Relocated

ABBRV	MEANING
REP	Repair
RET	Return
ROC	Run of crusher
RPM	Revolutions per minute
RR	Railroad
SABC	Stabilized aggregate base course
SAN	Sanitary
SBST	Single bituminous surface treatment
SEC	Second
SECT	Section
SF	Silt fence
SHT	Sheet
SIM	Similar
SP	Space(s)
SQ	Square
STA	Station
STL	Steel
SUPP	Supplement
SYM	Symbol
SY	Square yards
T	Thick
T&B	Top and bottom
TECH	Technical
TEMP	Temperature
THRU	Through
TOC	Top of curb
TOL	Tolerance
TRANS	Transformer
TW	Taxiway
UD	Underdrain
UGT	Underground telephone line
VASI	Visual approach slope indicator
VC	Vertical curve
VERT	Vertical
VS	Versus
W/	With
W/O	Without
WWF	Welded wire fabric
X	By (used between dimensions)
YD	Yard

ABBRV	MEANING
REQD	Required
REV	Revise
ROW	Right of way
RPZ	Runway protection zone
S	Slope
SALV	Salvage
SB	Straw bale
SCHED	Schedule
SEC Cor	Section corner
SEP	Separate
SF	Square feet
SHLD	Shoulder
SK	Sketch
SPEC	Specification
SS	Stainless steel
STD	Standard
STR	Structural
SWG	Swing
SYM	Symmetrical
SYS	System
T	Ton
TBM	Temporary bench mark
TEL	Telephone
THK	Thick
TL	Taxilane
TOG	Top of grate
TOP	Top of pavement
TSD	Temporary slope drain
TYP	Typical
UG	Underground
USGS	United States Geodetic Survey
VB	Valve box
VCP	Vitrified clay pipe
VFR	Visual flight rules
W	Water
WGT	Weight
WL	Water line
WP	Working point
XSECT	Cross section

D. SYMBOLS

1) As outlined on drawings

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01070

SECTION 01090 - REGULATIONS AND DEFINITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

B. If there is a discrepancy between the requirements of this section and related sections, the more restrictive interpretation shall apply.

1.2 DESCRIPTION OF REQUIREMENTS:

A. General: This section specifies procedural and administrative requirements for compliance with governing regulations, codes and standards imposed upon the work. These requirements include obtaining permits, licenses, inspections, releases and similar documentation, as well as payments, statements and similar requirements associated with regulations, codes and standards.

B. The term "Regulations" is defined to include laws, statutes, ordinances and lawful orders issued by governing authorities, as well as those rules, conventions and agreements within the construction industry which effectively control the performance of the work regardless of whether they are lawfully imposed by governing authority or not.

C. Governing Regulations: Refer to General Provisions, Special Provisions, and General Requirements for requirements related to compliance with governing regulations.

1.3 DEFINITIONS:

A. General Explanation: Certain terms used in contract documents are defined in this article. Definitions and explanations contained in this section are not necessarily complete, but are general for the work to the extent that they are not stated more explicitly in another element of the contract documents.

B. General Requirements: Provisions and requirements of Division 1 sections apply to the entire work of the contract and, where so indicated, to other elements which are included in the project.

C. Indicated: The term "indicated" is a cross-reference to graphic representations, notes or schedules on the drawings, to other paragraphs or schedules in the specifications, and to similar means of recording requirements in contract documents. Where terms such as "shown", "noted", "scheduled", and "specified" are in lieu of "indicated", it is for the purpose of helping the reader locate the cross-reference, and no limitation of locations is intended except as specifically noted.

D. Directed, Requested, etc.: Terms such as "directed", "requested", "authorized", "selected", "approved", "required", "accepted", and "permitted" mean "directed by the Engineer", "requested by the Engineer", and similar phrases. However, no such implied meaning will be interpreted to extend the Engineer's responsibility into the Contractor's area of construction supervision.

E. Approved: Where used in conjunction with the Engineer's response to submittals, requests, applications, inquiries, reports and claims by the Contractor, the term "approved" will be held to limitations of the Engineer's responsibilities and duties as specified in General Provisions and Supplementary Conditions. In no case will the Engineer's approval be interpreted as a release of the Contractor from responsibilities to fulfill requirements of contract documents or acceptance of the work, unless otherwise provided by requirements of the contract documents.

F. Project Site: The term "project site" means the space available to the Contractor for performance of the work, either exclusively or in conjunction with others performing other construction as part of the project. The extent of the project site is shown on the drawings.

G. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations."

H. Install: The term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations."

I. Provide: The term “provides" means "to furnish and install, complete and ready for the intended use."

J. Installer: The "installer" is the "the entity" (person or firm) engaged by the Contractor, its subcontractor or sub-subcontractor for performance of a particular element of construction at the project site, including installation, erection, application and similar required operations. It is a requirement that installers are experienced in the operations they are engaged to perform.

K. Engineer: The A/E firm contracted by the City of Defuniak Springs to prepare the Design Documents.

L. Design or Contract Documents: The drawings, specifications and Instruction to Bidders that indicate the project requirements and the Contractor’s contractual obligations for the construction of the proposed project.

M. Owner: Shall mean City of Defuniak Springs and Airport.

N. Owner’s designated representative: Shall mean Airport Staff, Airport Staff, or consultants contracted by the City of Defuniak Springs or designated by the Airport Director to act as representatives of the Owner.

O. “Contractor” – Shall mean the entity or corporation contracted by the City of Defuniak Springs to perform the scope of work.

P. AHJ: “Authority Having Jurisdiction” – Shall mean the local Building Department or other regulatory agency having jurisdiction for reviewing the scope of work and verifying compliance with governmental regulations (and monitoring compliance where applicable).

Q. A/E of Record: The term of “A/E of Record” (Architect or Engineer of Record), “Architect,” “Engineer,” “Landscape Architect,” “Structural Engineer,” shall mean the Architect or Engineer(s) or Landscape Architect responsible for generating the permit documents required for construction of the facility.

R. RPR: “Resident Project Representative,” Shall mean the Owner’s representative (Airport Staff or Consultant) employed or contracted by the City of Defuniak Springs to review and monitor the general quality of the work, the general compliance with the Contract Documents, the progress of work and construction activities performed by the Contractor. This representative shall not alleviate or supplant the Contractor’s required inspection and supervision of the construction activities.

1.4 SUBMITTALS: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01090

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SECTION 01095 - NPDES PERMIT CONFORMANCE

PART 1 - GENERAL INFORMATION

A. A National Discharge Elimination System (NPDES) General Permit for Storm Water Discharges from construction activities shall be obtained from The United States Environmental Protection Agency (EPA).

B. The NPDES permit program requires a Construction General Permit if the construction activity will disturb five acres or greater, or will disturb less than five acres but is part of a larger common plan of development or sale whose total land disturbing activities total five acres or greater (or is designated by the NPDES permitting authority); and will discharge storm water runoff from the construction site into a municipal separate storm water sewer system (MS4) or waters of the United States.

C. For this contract, the preparer of the design package has determined that a NPDES Construction General Permit is required to be submitted by the Contractor. It is therefore required that the Contractor read the permit requirements in the Construction General Permit cited in paragraph C, develop and implement a Storm Water Pollution Prevention Plan (SWPPP), and submit a NPDES Notice of Intent (NOI) to The Florida Department of Environmental Protection (FDEP). It will be the responsibility of the Contractor to complete and submit a Notice of Termination (NOT).

D. Detailed guidance on the development of the SWPPP is contained in EPA Publication EPA 832-R-92-005 dated September 1992, titled Storm Water Management for Construction Activities – Developing Pollution Prevention Plans and Best Management Practices.

PART 2 - SPECIFIC REQUIREMENTS

A. The Contractor shall design, develop, implement and comply with a Stormwater Pollution Prevention Plan (SWPPP) specifically for this construction site and including Best Management Practices (BMPs) and controls which prevent the pollution of storm water discharges.

B. The Contractor shall incorporate into the SWPPP all applicable requirements specified in state or local sediment and erosion control plans or permits or storm water management plans or permits. The Contractor shall submit a certification that the SWPPP reflects these requirements and that these requirements will be complied with during the term of the contract.

C. Prior to commencement of construction, the SWPPP must be prepared and certified by the Contractor. Notice of Intent (NOI) must be forwarded to the Environmental Protection Agency (with an information copy to the Owner) at least 48 hours prior to any land clearing.

D. Recordkeeping: The Contractor shall maintain the Plan and the associated records and reports, including documentation of the required inspections. These documents shall be

maintained at the job site until the site is finally stabilized. Thereafter, the Contractor (Permittee) shall keep the SWPPP and all reports for at least three years.

E. Report Submittal: The Contractor shall include with each payment request two (2) sets of information copies of all required inspection reports, certifications and notifications. Inspection reports to be submitted shall include both weekly reports and special reports required after rainfall events in excess of 0.5”. The regulations specifically require an onsite rain gauge. It is recommended that the Contractor record rainfall amount daily. Payment requests will not be processed in the absence of these submittals.

F. When the construction activity has ceased and all areas affected by the work are stabilized, the Contractor shall prepare, certify and submit the required Notice of Termination to the Environmental Protection Agency and the Owner. Final payment application will not be processed in the absence of these submissions.

PART 3 - PRODUCTS (Not Applicable)

PART 4 - EXECUTION (Not Applicable)

END OF SECTION 01095

SECTION 01100 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:

1) General Provision Section 50, “Control of Work”
2) General Provision Section 70, “Legal Regulations and Responsibility to Public”
3) General Provision Section 80, “Execution and Progress”
4) Section 01143, “Airport Project Work Procedures”.
5) Section 01500, “Temporary Facilities and Controls”

C. If there is a discrepancy between the requirements of this section and related sections, the more restrictive interpretation shall apply.

1.2 SUMMARY

A. This Section includes the following:

1) Project information.
2) Work covered by the contract.
3) Work under separate contracts.
4) Owner-furnished products
5) Use of premises.
6) Coordination with Airport and Tenants.
7) Work restrictions.
8) Specification and drawing conventions.

1.3 PROJECT INFORMATION

A. Project Identification: **Defuniak Springs Airport – Terminal, Hangar, and Apron Expansion**

FDOT PTGA – 429681-2-94-01

FAA A.I.P. – 3-12-0018-013-2021

B. Project Location: Defuniak Springs Airport

C. Owner: City of Defuniak Springs

D. Owner's Representative: Dan Edwards
DeFuniak Springs Airport
1931 U.S. Highway 90 West
DeFuniak Springs, FL 32433
850.892.2000
airportdirector@defuniaksprings.net

John Collins, PE
Project Manager
Avcon Engineers & Planners
320 Bayshore Drive
Suite A
Niceville, FL 32578
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850.678.0050
FL LIC. # 75419

E. A/E Design Professional: Michael Baker International, Inc.
4211 West Boy Scout Blvd., Suite 500
Tampa, FL 33607
Phone (813) 889-3892 Fax (813) 889-3893
Florida Certificate of Authorization Number 28861
Florida Architect License Number AA26002484
Contact: William "Chip" A. Hayward, Jr., AIA CSI CCCA, AR0011007

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents, and the Contract and consists of the following:

1) New construction of a General Aviation Facility, including new GA Terminal building, a future storage hangar, all sitework, site lighting, landscaping, parking lot improvements, apron improvements, security gates and fencing, garbage bin enclosure, tie-in to existing infrastructure and utilities, permitting fees, impact or utility connection fees, in order to provide a complete and operational facility as generally defined by the Contract Documents and the 2020 Florida Building Code, for a complete and functional facility.
2) Select demolition and related/select site work elements as required for the new GA Facility and related site improvements.

B. Type of Contract:

1) Project will be constructed under a Unit Price Contract, for the GA Facility.

1.5 WORK UNDER SEPARATE CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.

B. Concurrent Work: Owner has awarded separate contract(s) for the following construction operations at Project site. Those operations are scheduled to be occurring concurrently to work under this Contract.

1) None.

C. Concurrent Work – Owner Performed: Owner may perform work using his own forces at Project site. Those operations may be conducted simultaneously with work under this Contract, beyond the GA Facility site.

1) None.

1.6 USE OF PREMISES

A. General: Contractor shall have limited use of premises for construction operations as indicated on the Drawings.

B. Use of Site: Limit use of premises to work in areas indicated on the Drawings. Do not disturb portions of Project site beyond areas in which the Work is indicated or required for the proposed project.

1) Owner Occupancy: Allow for Owner occupancy of the Project site and use by the public
2) Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

a. Schedule deliveries to minimize use of roads, apron and driveways, and of security gates and entrances.
b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.7 OWNER'S OCCUPANCY REQUIREMENTS

A. Full Owner Occupancy: Owner or, the Owner's tenants or FAA personnel will occupy the airport and adjoining facilities to the project site during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations.

1) Maintain access to existing roadways, driveways, taxiways, runways and other adjacent occupied or used facilities. Do not close or obstruct roadways, taxiways

runways, parking lots or other occupied or used facilities without written permission from Owner and Authorities Having Jurisdiction.
2) Provide not less than seven days' notice to Owner of activities that will affect Owner's or Airport's operations.

B. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.

1) The Architect of Record will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.
2) Obtain a Certificate of Occupancy from Authorities Having Jurisdiction before Owner occupancy.
3) Before partial Owner occupancy, life safety, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. Upon occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of building.
4) Upon occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

1.8 OWNER-FURNISHED PRODUCTS

A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products and making building services connections. These items may be procured through State contracts and turned over to the Contractor for installation and coordination with the new work.

B. Owner-Furnished Products:

1) Refer to Appendix "B" – Owner Furnished items for additional items or building elements.

1.9 DRAWING AND SPECIFICATION FORMATS AND CONVENTIONS

A. Drawings and Specifications: The Drawings illustrate the general design intent, space requirements, and the minimum-base line-design requirements of the facility. These drawings are not intended to show a complete design; The Contractor shall be responsible for completing the delegated design for specific project elements requiring certification, further design refinement, and preparing the engineering (signed and sealed documents) for key delegated design elements required for construction of the facility as part of the FBC NOA requirements or as outlined in the Contract Documents.

B. Specification Format: Specifications are based on the Federal Aviation Administration (FAA) Standard Specifications for Specifying Construction of Airports as found in FAA Advisory Circular 150/5370-10H, The CSI Master Format 2016, FDOT Standard Specifications for Road and Bridge Construction – July 2019 edition and non-standard specifications developed specifically for this project. The CSI Specifications are

organized into Divisions and Sections using the 16-division format and CSI/CSC's "MasterFormat" numbering system.

C. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1) Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
2) Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01100

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SECTION 01135 – WEATHER DELAYS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

B. If there is a discrepancy between the requirements of this section and related sections, the more restrictive interpretation shall apply.

1.2 EXTENSIONS OF CONTRACT TIME:

A. If the basis exists for an extension of time in accordance with General Conditions, Article 8, an extension of time on the basis of weather may be granted only for the number of Weather Delay Days in excess of the number of days listed as the Standard Baseline for the entire construction duration of each phase as a whole.

1.3 STANDARD BASELINE FOR AVERAGE CLIMATIC RANGE:

A. The Owner has reviewed weather data available from the National Oceanic and Atmospheric Administration (NOAA) and determined a Standard Baseline of average climatic range for – Defuniak Springs Airport.

B. Standard Baseline shall be regarded as the normal and anticipatory number of calendar days for each month during which construction activity shall be expected to be prevented and suspended by cause of precipitation in excess of one-tenth inch (0.10”) liquid measure. Suspension of construction activity for the number of days each month as listed in the Standard Baseline is included in the Work and is not eligible for extension of Contract Time.

C. Standard Baseline (based upon precipitation in excess of one-tenth inch (0.10”) liquid measure) established for this contract is as follows:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
9.5	9	8	7	8	12	14.5	13	9	6.5	7.5	9

The Contractor shall include, at a minimal, the above noted rain delays within the construction schedule.

1.4 ADVERSE WEATHER AND WEATHER DELAY DAYS:

A. Adverse Weather is defined as the occurrence of one or more of the following conditions which prevents exterior construction activity or access to the site within twenty-four (24) hours:

1) precipitation (rain, snow, or ice) in excess of one inch (1") liquid measure;
2) temperatures which do not rise above 32 degrees F by 10:00 a.m.;
3) temperatures which do not rise above that specified for the day's construction activity by 10:00 a.m., if any is specified;
4) sustained wind in excess of twenty-five (25) m.p.h.;
5) any day that the Owner has requested no work to be performed.

B. A Weather Delay Day may be counted if adverse weather prevents work on the project for fifty percent (50%) or more of the Contractor's scheduled work day, including a weekend day or holiday if Contractor has scheduled construction activity that day.

Adverse Weather may include “dry-out” or “mud” days, as determined by the Architect such as:

1) For rain days above the standard baseline.
2) Only if there is a hindrance to site access or sitework, such as excavation, embankment, backfill, footings, etc. (see 4. & 5. below).
3) At a rate no greater than one (1) make-up day for each day or consecutive days of rain beyond the standard baseline that total 0.1 inch or more, liquid measure, if no substantial work is possible (see 4. & 5. below), unless specifically recommended otherwise by the Construction Manager/Architect.
4) If the Contractor’s activity is limited to approximately 50% of the Contractor’s activity before the Adverse Weather occurrence, then one-half (½) a weather delay day will be counted. For example if the Contractor is disking excavation and embankment areas to dry in situ moisture in the soils or hauling and placing unclassified excavation or borrow material to the embankment before an Adverse Weather occurrence, but is able to continue disking excavation and embankment areas or placing unclassified excavation or borrow material, one-half (½) a Weather Delay Day will be allowed.
5) If the Contractor’s activity is limited to minor activity when compared to the Contractor’s activity before the Adverse Weather occurrence, then one (1) weather delay day will be counted. For example if the Contractor is disking excavation and embankment areas to dry in situ soils, hauling borrow material to embankment before an Adverse Weather occurrence, but is only able to disk excavation and embankment areas to dry them due to the Adverse Weather occurrence, one (1) Weather Delay Day will be allowed.

C. If the Contractor is able to only perform disking operations to dry excavation and embankment areas due to in situ moisture in the soil, this is not considered an Adverse Weather occurrence or a Weather Delay Day and is considered to be a part of normal construction activities whether any other work can be performed or not.

D. The Owner will utilize monthly weather data from the Local National Weather Station or from on site observations to evaluate weather related delays; the determination of Contractor’s entitlement for any Weather Delay days, as defined hereinabove, will be based on the entire construction duration of the phase in lieu of a month-by-month consideration. The entitlements will consider those months that conditions are better or worse than the Standard Baseline established for this contract.

For example:

1) If the total number of standard baseline days for a Phase is forty one (41) days and there are thirty six (36) days with precipitation in excess of one tenth inch (0.10") liquid measure and ten (10) weather delay days, giving a total of forty six (46) rain and weather delay days. This would amount to five (5) days in excess of the total baseline days for that Phase. Five (5) additional days will be added to the time for that Phase.
2) If the total standard baseline for a Phase is forty one (41) days and there are twenty (28) days with precipitation in excess of one tenth inch (0.10") liquid measure and nine (9) weather delay days, giving a total of thirty seven (37) rain and weather delay days. This would amount to four (4) days better than the total baseline days for that Phase. Four (4) days will be deducted from the time for that Phase.

E. Baseline days will be prorated when partial months are a part of a phase/stage or the overall contract time. For example:

1) If the contract or a phase begins on April 11, including April 11, there are twenty (20) calendar days remaining in April. Twenty (20) remaining calendar days divided by thirty (30) total calendar days in April equals 0.6667. Six (6) total baseline days established for April multiplied times 0.6667 equals four (4) baseline days for the remaining twenty calendar days in April.

F. Paragraph 1.3.C above establishes a standard baseline of anticipated number of days of lost construction time for each month.

1) To calculate any liquidated damages for a phase/stage that is not completed on time, the number of baseline days for the actual total construction time for that phase/stage will be calculated from the standard baseline.
2) The number of weather delay days for the actual total construction time for that phase/stage will be calculated.
3) The difference in weather delay days and baseline days will then be calculated. Months that have less weather delay days than baseline days will result in a negative number.
4) The resulting difference will then be added to the contract time for the phase/stage.
5) The difference in the actual total construction time and the contract time plus weather delay days in excess of the baseline for that phase/stage will determine if and what the actual amount of liquidated damages for that phase/stage will be.

G. Weather Delay Calculation Example:

Using a **hypothetical** Phase 1 for example if:

FROM	TO	BASELINE DAYS	ACTUAL WEATHER DELAY DAYS	NUMBER OF DAYS IN EXCESS OF BASELINE
July 10, 2020	July 31, 2020	5	3	-2
Aug. 1, 2020	Aug. 31, 2020	7	11	+4
Sept. 1, 2020	Sept. 8, 2020	1	4	+3
		13	18	+5
Phase 1 Contract Time				60
Phase 1 Contract Time + Number Of Weather Delay Days In Excess Of Baseline				65
Phase 1 Actual Construction Time				67
Phase 1 Days Of Liquidated Damages				2

H. Contractor Reporting (Monthly Basis). Throughout the duration of the contract, the Contractor and the Owner shall reconcile impacts due to weather on a monthly basis. The Contractor shall submit monthly with the pay request an itemized list of; days impacted by weather, scheduled activity that was impacted and the impact which caused the delay (temperature, mud, snow, etc.).

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01135

SECTION 01140 – WORK RESTRICTIONS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:

1) General Provision Section 50, “Control of Work”
2) General Provision Section 70, “Legal Regulations and Responsibility to Public”
3) General Provision Section 80, “Execution and Progress”
4) Section 01100, “Summary”
5) Section 01143, “Airport Project Work Procedures”.

C. If there is a discrepancy between the requirements of this section and related sections, the more restrictive interpretation shall apply.

1.2 SEQUENCING:

A. The Contractor shall schedule his work activities in accordance with requirements of the Safety and Work Area Plans, and these Specifications unless otherwise approved by the Owner.

1.3 USE OF PREMISES

A. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of site beyond areas in which the Work is indicated.

B. Limits: Confine construction operations to areas indicated in the documents and necessary to the progress of the Work.

C. Owner Occupancy: Allow for Owner occupancy of site and use by the public. The Owner will endeavor to cooperate with the Contractor's operations when the Contractor has notified the Owner in advance of need for changes in operations in order to accommodate construction operations. Conduct the work so as to cause the least interference with the Owner's operations.

D. Driveways and Entrances: Keep aprons, driveways, roadways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

E. Schedule deliveries to minimize use of driveways, roadways and entrances.

F. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

G. Delivery vehicles, construction vehicles and other construction related hauling vehicles are restricted to the hauling/travel routes identified on the Site Plan, unless otherwise authorized, in writing, by the Owner.

H. Storage areas will be available on site; limited staging and storage areas will be available adjacent to new building.

1.4 OCCUPANCY REQUIREMENTS

A. Full Owner Occupancy: Owner will occupy the existing aprons, parking lots and airport facilities during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations.

B. Existing Utilities: Disruption of utility services to the existing airport facilities will not be acceptable. The Contractor shall schedule all utility tie-ins with local utility service providers, and with the Owner a minimum of seven (7) calendar days before service interruption is scheduled to occur. The Contractor shall schedule utility tie-ins during off-peak hours to minimize disruption of airport operations, unless otherwise noted. Utility service shall not be disrupted for more than four (4) hours. Off-peak hours are defined as 8:00 p.m. to 7:00 a.m.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 COORDINATION WITH OCCUPANTS

A. Occupied areas include all areas in which the Owner's regular operations will be going on or to which the Owner requires access during the construction period, whether conducted by the Owner or his tenants, clientele, or the public.

B. Construction related activities, in general, may proceed during normal working hours, unless the work will interfere with operating procedures of the Airport. When this interference occurs, the Contractor shall arrange the required activities and work schedule to be performed during non-operating hours of the area of the Airport affected. The existing facilities are generally in operation during daytime hours, seven days per week. The Contractor shall have the option of working areas which are not in operation when the construction activities cause neither interference nor safety or security problems to the users of the Airport.

C. Limit access through occupied site areas to those days and times, which the Owner approves.

D. The Contractor shall review the plans and shall submit an updated layout plan for providing safe and secure passageway for users of the Airport during construction

activities. Any access or egress routes, which are required exits in accordance with the code, shall be maintained at all times during the construction of any given area.

E. When the following must be modified, provide alternate facilities acceptable to the Owner:

1) Site entrances and parking lots which must remain open.
2) Perimeter fencing and gates which are part of the Airport's Air Operations Area (AOA) demarcation shall remain secured at all times.
3) Utilities which must remain in operation.
4) Informational signage to direct the movement of airport patrons, tenants, clientele, or the public.

3.2 UTILITIES

A. Utilities are located within the construction area. Contractor shall coordinate with the Owner, the Contractor's surveyor, utility locate services, and Engineer to identify all utilities. Contractor shall be responsible for contacting utility owners and locating all existing utilities within the work area. Contractor shall be responsible for costs associated with utility location, protection, and for required repairs due to failure to comply with these requirements.

B. Information concerning underground utilities and service lines may be obtained from the utility companies, Owner and the FAA. The Owner does not guarantee their accuracy of information provided regarding existing conditions and utilities. The Contractor is advised to determine the exact locations from the available sources of information, or provide his own means of detection.

C. Contractor shall notify Airport personnel, Airport Tenants, utility companies, FAA personnel, and local utility agencies personnel before excavating in any area.

D. Agencies / utility companies with service on the Airport are listed in Subsection 70-15 of the General Provisions.

E. In all construction areas, all FAA cables shall be marked by the Contractor prior to construction. Contractor is to protect cables during construction. Contractor shall notify FAA supervisor in advance of construction activity to avoid unscheduled facility outages. Any FAA equipment/cable that is damaged by the Contractor shall be repaired as approved by the FAA supervisor / representative. All cable splice/repairs shall meet FAA specifications and be accomplished to the satisfaction of the FAA representative. Qualified workmen regularly engaged in that type of work shall perform all cable work. If an existing cable cannot be repaired to the satisfaction of the FAA, new cable of like kind shall be installed.

F. Maintain existing surface and pipe storm drainage, unless otherwise noted.

3.3 USE OF SITE

A. The Contractor shall at all times conduct his work so as to create no hindrance, hazard, or obstacle to vehicular or aircraft traffic using the Airport.

B. The Contractor shall control his or her operations and the operations of his or her subcontractors and all suppliers so as to provide for the free and unobstructed movement of aircraft in the aircraft operations areas of the airport. This area shall be accessible to the Contractor on a limited basis.

C. Aircraft always have right of way in operating areas.

D. Access to the work: access to the work will be via the access routes shown on the plans or as directed by the Owner. The Contractor shall identify access routes with suitable signs, barricades and similar equipments.

E. All construction traffic shall enter and exit the project area through access points directed by the Owner. Contractor will be responsible for security of construction access gates in accordance with the airport's security plan.

F. Haul Route: All existing roads and parking lot areas that will be used as part of the haul road will be restored to their original condition. After completion of the project the Contractor will be responsible for daily clean up operations of debris that may be on the haul road.

G. The existing airport pavements, access roads, and haul routes may not be capable of supporting certain types of construction equipment. Prior to bidding, the Contractor shall fully satisfy himself as to the ability of the existing airport pavements to satisfactorily sustain the type of equipment he plans to use. Contractor shall size the equipment used for construction accordingly. The Contractor at no additional cost to the Owner shall repair any damage caused by hauling or any other construction activity to existing pavement.

H. It is of specific importance that all aircraft operating areas, parking lots, and landscaped areas be kept free of construction related debris due to potential aircraft damage. The Contractor shall police the construction and adjacent site area regularly to assure that no debris creates an endangerment to aircraft. Contractor shall maintain these pavements clean throughout the project.

I. Project access, staging area, waste area, stockpile area and all haul roads shall be restored to original condition including topsoil and seeding at job completion at no additional cost to owner.

J. The location (and size) of the Contractor's staging area will be determined at the pre-construction conference.

K. All construction material and equipment shall be located and stored in the designated staging area(s) only.

L. The Contractor will be responsible for the cleanup and disposal of all trash and debris created by his work or personnel within the Project Work Area and adjoining Public Areas. All trash and debris must be disposed of offsite.

M. The Contractor will be responsible for the storage and security of his material and equipment and shall erect storage facilities and fencing as necessary. The Contractor's storage and staging area shall be in the general location(s) shown on drawing.

N. Contractor shall control dust at an acceptable level. The Contractor shall be required to keep a water supply at the project site during heavy equipment usage areas.

O. Burning of debris will not be allowed on the Airport property.

P. All vehicles operated on existing pavements to remain shall be rubber tired.

Q. The Contractor shall not enter or encroach upon an aircraft parking area or operational taxiway without first obtaining permission from the Owner or FAA.

R. Damage to aircraft, ground equipment, or facilities on the ground, resulting from hauling or storage of material or other activities in connection with the execution of the contract work, shall be repaired or replaced by the Contractor in as good or better condition as originally found.

S. Stock-piled material shall be constrained in a manner to prevent movement resulting from aircraft engine blast or wind.

T. All vehicles of the Contractor's forces shall be parked in designated areas only. Contractor to provide temporary gate and fencing at perimeter and is to be responsible for security, maintenance, and restoration of areas.

U. In the event the Contractor services his equipment on Airport property, all oil and fluids removed from the equipment must be collected and disposed of in accordance with the local, state and federal environmental laws. If a hazardous, or regulated material is spilled, it must be promptly reported to the airport and cleaned up by the Contractor at Contractor’s expense.

V. Temporary fencing and vehicle barricades shall not be secured to the pavement and these items shall be self-supporting without the need to core the pavements or the use of anchor bolts.

3.4 PHASING AND SEQUENCING

A. Existing easements to other properties shall be maintained at all times. Areas outside the project limits are designated as restricted areas. The Contractor's forces are prohibited from entering restricted areas at any time, unless specifically authorized by the Airport operations department.

B. The Contractor shall be responsible for visiting the site to become familiar with the existing conditions. The Design Documents shall serve to aid the Contractor in the evaluation of the sequences and extents of construction; but shall not be held to be all-inclusive. Any conflicts or apparent deficiencies must be submitted in writing prior submission of the RFP response.

C. Portions of the Airport shall be occupied during construction. The Contractor shall comply with the following life safety issues. Failure to list all life safety issues does not

relieve the Contractor from complying with federal, state and local codes, the contractual agreement between the Contractor and Owner, and other governing bodies which have jurisdiction on this project. The following are interim life safety code issues which are specific to this project and must be addressed:

1) Insure all tenant facilities, fire hydrant access, building entrances and exits provide free and unobstructed ingress and egress.
2) Insure access to AOA areas are secured at all times.

D. Smoking shall only be allowed in designated areas outside of the buildings.

E. Develop and enforce storage, housekeeping and debris removal procedures that reduce the flammable and combustible fire load to the lowest level necessary for daily operations.

F. Secure all tools and construction materials during breaks and non-construction hours.

END OF SECTION 01140

SECTION 01143 – AIRPORT PROJECT WORK PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:

1) General Provision Section 50, “Control of Work”
2) General Provision Section 70, “Legal Regulations and Responsibility to Public”
3) General Provision Section 80, “Execution and Progress”
4) Section 01100, “Summary”
5) Section 01140, “Work Restrictions”.
6) Section 01320, “Construction Progress Documentation”

C. If there is a discrepancy between the requirements of this section and related sections, the more restrictive interpretation shall apply.

1.2 INTRODUCTION – AIRPORT OPERATIONS

A. The safety of the Airport patrons and personnel and of the Contractor’s personnel is paramount throughout construction. Except where stricter requirements are indicated, the Contractor shall follow the safety guidelines outlined in the CSPP.

B. This project may include Contractor operations within active Air Operations Areas (AOA), which is demarcated by the airfield security fencing. The Airport will conduct normal aircraft operations during the course of this project, subject to certain restrictions called out in this section or elsewhere in the specifications. Therefore, to provide for the security and safety of Airport users and the Contractor’s forces, as well as to minimize interruptions to aircraft operations, the Contractor shall limit his work within the areas designated and conduct his operations as specified.

C. Unauthorized crossing of the AOA is prohibited.

1) Any fines or assessments levied against the Sponsor (Owner) as a result of intrusions in the AOA or other violations by the Contractor’s personnel or those of his subcontractors and suppliers will be passed on to the Contractor and assessed against the Contract Amount on the next Application for Payment.
2) In addition to any fines assessed to the individual and the Sponsor, the Contractor will be subject to a fine per incident, assessed by the Sponsor.

a. For the first incident, the individual and firm will be fined $2,500.
b. For the second incident, the individual and firm will be fined $5,000.
c. For the third incident, the individual, and possibly the associated firm, may be prohibited from the Secured Area, from the Work area, or from the Airport property, at the sole discretion of the Airport.

D. Construction Scheduling and Coordination: The Work will be conducted so as to provide the least possible interference with the Owner's, tenants, and FAA daily operations. Prior to commencing Work on-site, the Contractor shall submit, and secure approval from the Owner, a complete schedule for the project, identifying any expected periods of potential conflict.

E. Coordinate Construction Activities with Airport Operations and Security Plan:

1) Provide and/or secure the following:

a. Safety Plan Report
b. Quality Assurance Plan Report
c. Security badges/training (Where AOA access is required)

2) Reports under this heading shall be prepared in compliance with Airport Operations Department requirements.

F. Contractor may contact Airport Operations OR Designated Representative for requirements and clarifications related to this topic.

1.3 AIRPORT SAFETY

A. Contractor shall obtain, have knowledge of, and incorporate the following safety provisions into the construction project:

1) Operational Safety on Airports During Construction – AC-150/5370-2G, latest edition, (attached as Appendix A).
2) Airport Safety Self-Inspection – AC-150/5200-18C, latest edition.
3) Painting, Marking, and Lighting of Vehicles Used on an Airport – AC 150/5210-5D, latest edition.
4) Consideration of Improvement of Airport Safety – FAR, PART 139.

B. Contractor shall comply with all Airport rules and regulations and security requirements that may be established to protect airport operations.

1) Additional notes on the Drawings and in the general requirements sections of these Documents provide a level of safety and security requirements and guidelines.
2) The Contractor shall incorporate the CSPP and Airport guidelines and requirements into his Safety Plan Compliance Document (SPCD), and attain Owner's approval in advance of mobilizing Contractor's forces on the Airport premises.
3) Failure to comply with the SPCD, or violation of any Airport safety and security regulations and protocols, will result in disciplinary action. At a minimum, violations will result in temporary restriction of an individual's access to secure areas of the Airport. Disciplinary actions may, as relates to the type and nature of the violation, and is at the Airport's sole discretion, disciplinary actions may include:

a. Verbal reprimand and temporary revocation of access privileges
b. Temporary revocation of access privileges and mandatory re-training in Security Class and Airport Safety and Security procedures
c. Permanent restriction of access privileges
d. Permanent loss of access privileges
e. Restriction from worksite

f. Restriction and removal from Airport property(ies)
g. Fines, as defined elsewhere in this document or in the security plan

C. All actions of the Contractor's employees, subcontractors and suppliers are the sole responsibility of the Contractor. All employees, subcontractors and suppliers must be educated regarding related work and the safety requirements of the aircraft operations area and public safety adjacent to the construction area.

D. Observe and/or follow all safety related instructions by any Federal Aviation Administration (FAA), Transportation Security Administration, and Airport personnel at all times.

1) In case of emergency, the Contractor shall make every effort to remove the equipment and personnel from affected area(s) and abide by decisions made by the Owner or his/her representative.

a. To the best of his ability, the Contractor shall immediately comply with directives from representatives of the FAA and Transportation Security Administration. Contractor will then promptly notify first the designated Airport Operations representative and second the Owner's project representative of the incident.
b. See General Conditions and other parts of this Section for additional information in case of emergencies and other unforeseeable conditions beyond the Control of the Contractor or the Owner, which may include acts of God or the public enemy, acts of government, hurricanes, fires, floods, or safety and security incidences and changes in national transportation safety and security procedures.

E. The Contractor shall cooperate with the Airport users and tenants, through the Owner, in scheduling of all work operations.

F. Vehicular Markings: Contractor vehicles and equipment shall be marked with checkered flags and lighted with flashing beacons to comply with requirements of FAA AC 150/5210-5D, latest edition, when operated within the airfield or SIDA.

G. Obstructions to Navigation:

1) Violation of Safety Zone Surfaces: Penetration of equipment, vehicles, materials, or men into the safety zones and approach surfaces requires the preparation and distribution of Notices of Airmen (NOTAMs) in advance to the actual penetration.
2) Scheduling: When part of the work in this project is in violation of FAR Part 77, the clearance distance requirements from runway and taxiway edges shall be incorporated into the construction sequence schedule. At no time shall the construction limits of the area under construction violate the safety zones without prior notification to and approval by the Engineer.

H. Coordination and Communication: Work within and adjacent to active AOAs shall be coordinated with the Owner prior to commencement of the activity. Work crews in these areas shall be accompanied by the construction superintendent who shall be in constant radio contact with ATC.

I. Safety and security can be discussed with the Contractor or the Contractor's safety representative at the Pre-Construction Conference and at progress meetings at the job site.

1.4 AIRPORT SECURITY

A. Secured Area Requirements: As part of the Airport Security Plan, the Contractor will be required to adhere to all FAA and TSA security requirements and all construction personnel working in, or having access to, secure areas (AOA) will be required to obtain and wear badges issued by the Owner and comply with provisions of the Airport Security Plan and Airport Rules and Regulations:

1) Badges will be required for most construction personnel. The Contractor's superintendent and supervisors, all approved equipment escort personnel, and other select personnel shall be trained, certified and badged for operations within the Secured Area as defined with the current approved Airport Security Plan.

2) Obtain necessary clearances and identification badges for construction personnel through the Airport Operations Department (See Special Conditions, "Airport Security Provisions"). The badges shall be returned at project completion.

3) Applications for clearance check and other required forms should be turned into Airport Operations. A photo identification badge will be issued for each approved application.

a. The badge remains property of the Owner. There is no charge for the initial badge itself.
b. A non-refundable fee of Seventy-Five Dollars ($75.00) fee will be assessed if a badge holder loses the badge or does not return the badge at the completion of the project, or upon request of Airport Operations, or if a badge holder fails to report a lost badge in a timely manner.

4) Each badge holder will be required to comply with the security rules and regulations of the Punta Gorda Airport.

a. The Airport could suffer severe fines or penalties as a result of security violations.
b. The Contractor will be responsible for these fines or penalties for any security violations that are his responsibility.
c. In addition to fines assessed by the Federal Regulatory Agencies for security violations, the Contractor, and the responsible individual, will be assessed a fine for each violation, as described elsewhere in this Section.

B. The Contractor shall provide security within the construction area and shall keep all unauthorized personnel out.

C. Contractor should confine all construction personnel to within the construction limits during each phase of the work.

D. Contractor security measures will be discussed and reviewed at the Pre-Construction Conference.

1.5 CONSTRUCTION SAFETY REQUIREMENTS:

A. General Safety and Accident Prevention: The Contractor shall comply with all applicable federal, state, and local laws, ordinances, and regulations governing safety, health, and sanitation; shall provide barricades; and shall take any other needed actions, on the Contractor's own responsibility, that are reasonably necessary to protect the life and health of employees on the job, the safety of airport users, and the safety of moving and parked aircraft, and other property during the performance of the work.

1) Safety Officer: The Contractor is required to designate a Safety Officer who will be the liaison between the Contractor and the Owner in all safety related matters for the duration of the project. The Safety Officer shall be on call 24 hours per day for emergency maintenance of airport hazard lighting, barricades, and other safety features.

a. The Safety Officer's duties shall include accident prevention.

B. Portions of the Airport shall be occupied during construction. The Contractor shall comply with the following life safety issues. Failure to list all life safety issues does not relieve the Contractor from complying with federal, state and local codes, the contractual agreement between the Contractor and Owner, and other governing bodies which have jurisdiction on this project. The following are interim life safety code issues which are specific to this project and must be addressed:

1) Insure all tenant facilities, fire hydrant access, building entrances and exits provide free and unobstructed ingress and egress.
2) Insure access to AOA areas are secured at all times.

C. Smoking shall only be allowed in designated areas outside of the buildings.

D. Develop and enforce storage, housekeeping and debris removal procedures that reduce the flammable and combustible fire load to the lowest level necessary for daily operations.

E. Protection of Utilities: The Contractor shall be responsible for field marking and protecting all utilities within the construction limits.

F. Storage of Equipment, Vehicles, and Materials: All equipment, vehicles, and materials must be stored in the designated storage or staging area or in areas acceptable to the Airport during breaks and non-construction hours.

G. Limitations on Construction Methods:

1) No open flames or burning will be allowed on Airport property. Burning of debris will not be allowed on airport property
2) Stockpiled material shall be constrained in a manner to prevent displacement by jet blast, propeller blast, or wind.

H. Prior to commencing the work, Contractor shall obtain all necessary permits and approvals, including building construction permits, required for the project.

I. Contractor to submit a SPCD for approval within ten days of receipt of the Notice to Proceed, but in no case later than the Pre-Construction Conference.

1.6 PHASING AND SEQUENCING

A. The Contractor shall schedule all work activities in accordance with requirements of the Owner approved work sequence and phasing prepared by the Contractor and these Specifications unless otherwise approved by the Owner.

B. Existing easements to other properties shall be maintained at all times. Areas outside the project limits are designated as restricted areas. The Contractor's forces are prohibited from entering restricted areas at any time, unless specifically authorized by the Airport.

1) Construction stakeout shall be performed by Contractor in accordance with Subsection 50-07 of the General Provisions. It shall be the responsibility of the Contractor to provide all measurements that may be required to lay out the construction.

C. Contractor shall be responsible for visiting the site to become familiar with the existing conditions. The Design Documents shall serve to aid the Contractor in his evaluation of the sequences and extents of construction; but shall not be held to be all-inclusive. Any apparent conflicts or deficiencies must be submitted in writing, prior to Submission of the RFQ Response.

1.7 USE OF PREMISES

A. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1) Limits: Confine construction operations to staging areas, and areas identified for each phase of construction elsewhere in the Construction Documents.

a. Restricted Areas: Secure Identification Display Areas, Secured Area, and Aircraft Operations Area:

1) Access to some areas of the Project Work Area is restricted to cleared personnel. Contractor shall be responsible for the performance of the Contractor's own forces, of all subcontractors and subcontractors' forces, and suppliers.
2) Contractor is responsible for making all Contractor and subcontractor or other construction related forces on site aware of the Airport Security Program as it relates to access to the Airport Operations Area.
3) Perform work in a manner so as to limit construction activities in restricted areas of the Airport. Contractor's approved Superintendent shall be present for any construction activity that is expected to occur in the Secured Area.

2) The Owner will endeavor to cooperate with the Contractor's operations when the Contractor has notified Airport Operations or designated representative in advance of need for changes in operations in order to accommodate construction operations.

Conduct the work so as to cause the least interference with the Owner's and tenant's/FAA tower operations.

3) Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, tenants, patrons, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

   a. Schedule deliveries to minimize use of driveways and entrances.
   b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
   c. Delivery vehicles, construction vehicles and other construction related hauling vehicles are restricted to the hauling/travel routes shall be identified on the Contractor's layout Plan approved by the Airport, unless otherwise authorized, in writing, by the Airport or designated representative.
   d. The area immediately adjacent to the Area of Work is limited. Coordinate transportation of workers and equipment from the Staging Area to this area in order to limit the number of vehicles present. Limit total number of vehicles in this area to the space available, and as approved in advance by Airport Operations or designated representative. Only authorized work vehicles, as described elsewhere in this document, will be allowed access to the Secured Area. No personal vehicles will be allowed in the staging areas within the Secured Area.
   e. Storage areas will be available on site.

4) Signs: Provide signs adequate to direct visitors, tenants, and airport patrons. Do not install, or allow to be installed, signs other than specified sign(s) and signs identifying the principal entities involved in the project.

B. Emergency Preparedness / Special Event Conditions: The Contractor shall fully participate with the City of Defuniak Springs in reasonable measures to protect the general public, the City of Defuniak Springs and the Airport, their employees, the Contractor and his employees, and his forces, equipment, and materials from damages from unforeseeable causes beyond the control of the Owner or the Contractor, including but not limited to: unusual weather events, acts of God, acts of public enemies, acts of government, fires, floods, discovery of pre-existing hazardous materials or hazardous conditions, epidemics, quarantine or public-health regulations, and strikes or lockouts.

1) In the event of an emergency affecting the safety or security of the public, Airport tenants, Airport employees, Contractor or subcontractor employees, the Project, other property or individuals, then the Contractor, without special instruction or authorization, shall act to prevent and reduce injury, damage, or loss.

   a. Upon observation of conditions, acts or events indicating risk to safety or security anywhere on Airport property, Contractor shall immediately notify Airport Operations, RPR and/or designated representative.

2) The Contractor and representatives of primary subcontractors, to include at a minimum the Superintendent, Safety Coordinator, and Security Coordinator, shall attend and take part in emergency preparedness planning meetings organized by the Airport.

3) In the event of foreseeable (at least 24-hours advance warning) uncontrollable conditions that may impact the Airport (e.g., approaching hurricane), the Contractor is responsible for securing the Project Area to reduce risk of damage to persons or property, to the satisfaction of the Owner. Upon notice from Airport Operations or designated representative or other authority having jurisdiction of impending hazardous conditions, the Contractor shall:

    a. Enclose any in-progress openings in the building envelope with weather-proof temporary partitions.
    b. Cover exposed substrates or incomplete exterior finishes securely with anchored water-resistant coverings.
    c. Secure unused materials in containers and/or trailers and remove from areas in, on, or adjacent to construction or existing buildings.
    d. Remove all equipment or materials that are likely to become air- or water-borne, to include staging materials and temporary facilities, from, on or adjacent to the AOA.
    e. Remove cranes, hoists, and other mobile equipment over ten feet tall from the site, or to covered storage, if allowed by Airport Operations or designated representative.
    f. Remove all non-essential vehicles from the Site, and secure off-site under Contractor's care and control.
    g. When practical, completely demobilize any staging areas on the Airside (AOA) of permanent fences and relocate to other staging areas on the non-secure side of the security fence.
    h. When practical, remove equipment and materials to secured storage off-site, approved per other parts of these specifications.
    i. Cover, secure, and anchor any equipment and materials in the non-secure staging area that cannot practically be relocated to secured storage off-site.
    j. Secure the Work and Site as is most practicable, and in the best interests of the public, the Project, the Owner, and Contractor.
    k. Provide Airport Operations or designated representative with emergency contact information for key personnel.
    l. Evacuate non-essential personnel to safer locations.

4) Contractor is fully responsible for the safety and security of the Project throughout Construction. In any special event, should the Contractor fail to remove forces, equipment, and materials under his control from the Owner property, or to secure the same and the Work to the satisfaction of Airport Operations or designated representative, and in the opinion of Airport Operations or designated representative those forces equipment, or materials shall be at risk of injury, damage or loss, or of causing injury, damage, or loss to the Owner or others; then the Owner may, or may not, choose to remove, relocate, or secure the Work by whatever means the Owner deems in the best interest of the Owner and the Project.

    a. The Contractor agrees in a special event that he has abandoned any property not secured to the satisfaction of Airport Operations, RPR or designated representative.
    b. Should the Owner be required to secure items under the control of the Contractor, the Contractor shall reimburse the Owner for actual costs incurred in securing the Work, to include, but not limited to, labor, oversight, use of

equipment, rental of equipment, cost of fuels, storage fees, material, utilities, and incidentals.

c. The Owner assumes no responsibility for damage or loss of Contractor property, equipment, materials or parts of the Work not secured by the Contractor, or necessitated to be secured or relocated in the interests of public safety or security.

C. Cleanliness of Site: Contractor shall be responsible for keeping aircraft operations areas, movement areas, ground service routes, work open to or visible from public areas, tenant operations areas, work areas used or accessed by others, haul route, parking lots, landscaped areas/grounds, and staging areas in an orderly and clean condition.

1) Areas on or adjacent to aircraft operations shall be kept clean and free of loose debris that may pose a hindrance to airport operations. Contractor shall police area on a regular basis, provide adequate containers for anticipated debris, and remove loose debris and containers to storage away from aircraft operations area and security fence on a more-than-daily basis. Further requirements are noted elsewhere in the contract documents, the drawings and project manual.
2) The Contractor shall clean up construction debris on a regular basis and as directed by the Owner. Debris and materials scheduled for recycling shall be secured or removed from the building site.

1.8 OCCUPANCY REQUIREMENTS

A. Owner Occupancy: Allow for Owner occupancy of the site and use by the public.

B. Full Owner Occupancy: Owner will occupy site and the temporary rental car offices and the FAA tower during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations.

C. Partial Owner Occupancy: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.

1) Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work that may be occupied before Owner occupancy.
2) Obtain a Certificate of Occupancy from Authorities Having Jurisdiction before Owner occupancy.
3) Before partial Owner occupancy, life safety, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will provide, operate, and maintain mechanical and electrical systems serving occupied portions of building.
4) On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

1.9 COORDINATION WITH DAILY OPERATIONS

A. Occupied areas include all areas in which the Owner's regular operations will be going on or to which the Owner or the Airport's tenants requires access during the construction period, whether conducted by the Owner or his tenants, clientele, or the public.

B. On-Site Work Hours: **Construction related activities, in general, shall proceed during normal working hours, unless the work will interfere with operating procedures of the Airport. When this interference occurs,** the **Contractor shall arrange the required activities and work schedule to be performed during non-operating hours of the area of the Airport affected**. Some areas of the Airport are in operation for fewer hours each day than the overall operating hours, and the Contractor shall have the option of working those areas which are not in operation when the construction activities cause neither interference nor safety or security problems to the users of the Airport. Contractor may, upon approval of the Owner, choose to conduct construction activities during off hours. Work in public areas, and work impacting airport or tenant operations areas and utility connections, shall be coordinated with the Airport and respective tenants not less than thirty (30) calendar days in advance of anticipated work in those areas. Provide an updated schedule seven (7) days in advance of anticipated work in the above-noted areas.

1) Normal Operating Hours: The existing facilities generally in operation between the hours of 7:00 am and 8:00 p.m., seven days per week. Precise work hours shall be coordinated with Airport at Pre-Construction Conference, and may be adjusted, if needed, at monthly meetings thereafter.
2) Off-Hours: Off hours are generally defined between as being between 8:00 p.m. and 7:00 am in most areas.

    a. Contractor shall limit and restrict Work during off-hours. Contractor shall coordinate with Airport not less than fifteen days in advance of performing any off-hours work and shall be responsible for reimbursing the Owner for additional costs incurred to provide staff during non-normal hours.

C. Coordination with Aircraft Operations: Contractor shall coordinate all construction activities and work to minimize impacts to the Airport, and tenant operations.

D. When the following must be modified, provide alternate facilities acceptable to Airport Operations or designated representative:

1) Entrances and driveways which must remain open.
2) Utilities which must remain in operation.
3) Informational signage to direct airport users and patrons.

E. Scheduling: Contractor shall review and coordinate the Construction Schedule with RPR.

1) Submit a comprehensive preliminary construction schedule for review fourteen (14) calendar days in advance of the Pre-Construction Conference. Refer to other sections of the General Provisions and these general requirements for additional information.

2) Changes to the approved construction schedule will not be allowed unless approved by Airport Operations or designated representative in writing. A construction schedule with project sequencing and coordination timetables for construction adjacent to or within aircraft operation areas must be approved before any work commences.
3) Changes to Security Operations: Notify Airport Operations in writing at least fourteen calendar days in advance of any proposed changes affecting the Secured Area, including any changes to the security fence, any gates opening to the Secured Area, access control devices at gates on the line of demarcation, modifications to staging areas in the Secured Area, modifications to Security Operations such as using a guard at a gate rather than existing access control. Proposed changes, including temporary changes, to the Airport Security Plan must be approved and filed with the authorizing agencies not less than thirty days prior to the change taking affect. Contractor shall be liable for any delays in prosecuting the Contractor's work resulting from failure to provide sufficient notice.
4) Notify Airport Operations at least seven (7) days in advance of any proposed changes to the construction schedule for approval.
5) Notify Airport Operations at least ten (10) calendar days in advance of mobilizing to the project staging area.
6) Notify Airport Operations at least thirty (30) days in advance of any demolition activities and coordinate the relocation of any Airport tenants within the existing facilities.
7) At times and days to be determined at the Pre-Construction Conference, bi-monthly meetings shall be held involving the Contractor's superintendent, the Architect/Engineer and Airport Operations or designated representative; weekly meetings may be held involving the construction superintendent and the Owner's designated representative.
8) The Contractor shall be responsible for informing in writing the Airport of the construction schedule for the approaching two weeks' construction activity.
9) All subcontractors shall supply the above information to the Contractor for inclusion in their report. Any storage of materials, access or egress problems, traffic flow or normal airport operations which are to be affected must be protected and/or agreed upon by Airport Operations or designated representative. All costs shall be incurred by the Contractor.

1.10 UTILITIES

A. Utilities are located adjacent to and within the construction area. Contractor shall coordinate with the Engineer and the Airport to identify utilities. Contractor shall be responsible for contacting utility owners and locating all existing utilities within the work area. Contractor shall be responsible for costs associated with utility location, protection, and for required repairs due to failure to comply with these requirements.

B. Information concerning underground utilities and service lines may be obtained from the utility companies, Owner, and the FAA. The Owner does not guarantee the accuracy of any information provided regarding existing conditions and utilities. The Contractor is advised to determine the exact locations from the available sources of information or provide his own means of detection.

1) Agencies / utility companies with service on the Airport are identified in subsection 70-15 of the General Provisions.

C. Contractor shall notify Airport personnel, utility companies, and FAA personnel, before excavating in any area.

D. In all construction areas, all FAA cables shall be marked by the Contractor prior to construction. Contractor is to protect cables during construction. Contractor shall notify FAA supervisor in advance of construction activity to avoid unscheduled facility outages. Any FAA equipment/cable that is damaged by the Contractor shall be repaired as approved by the FAA supervisor / representative. All cable splice/repairs shall meet FAA specifications and be accomplished to the satisfaction of the FAA representative. Qualified workmen regularly engaged in that type of work shall perform all cable work. If an existing cable cannot be repaired to the satisfaction of the FAA, new cable of like kind shall be installed.

E. Maintain existing surface and pipe storm drainage, unless otherwise noted.

PART 2 - PRODUCTS

2.1 BARRICADES

A. Barricades shall be constructed and installed as described in other sections of the specifications and as shown on the drawings, and in accordance with the CSPP.

B. Maintain barricades throughout construction.

1) Inspect barricades in place at least twice daily to ensure correct placement and functional flags and light.
2) Immediately correct any damage or disrepair, or replace barricade.

C. Furnish and maintain all barricades lights.

1) Supply all batteries and lamps for barricade lights necessary for Project.

D. Remove and relocate barricades as directed by Airport Operations or designated representative during construction in accordance with referenced guidelines.

PART 3 - EXECUTION

3.1 COORDINATION

A. The Contractor shall have a general supervisor on the job at all times during construction activity.

B. The Owner will designate a representative who will issue all Notices to Airmen (NOTAMs) with the Federal Aviation Administration.

C. The Contractor shall furnish the Owner with the necessary information on construction conditions (apron closure, tie-ins to existing movement areas, etc.) so that the Airport can advise flight control to issue NOTAMs in accordance with established criteria.

D. The Contractor shall make reasonable effort to coordinate with separate Contractors working in the same area or adjacent areas. Specific overlap areas are noted elsewhere in the contract documents, the drawings and project manual.

3.2 CONTRACTOR OPERATIONS ON SITE

A. The Contractor shall at all times conduct the Contractor's work so as to create no hindrance, hazard, or obstacle to vehicular or aircraft traffic using the airport.

1) The Contractor shall control his operations and the operations of his subcontractors and all suppliers so as to provide for the free and unobstructed movement of aircraft in the aircraft operations areas of the airport. This area shall be accessible to the Contractor on a limited basis.
2) Aircraft always have right of way in operating areas.
3) The Contractor shall not enter or encroach upon an aircraft parking area or operational taxiway without first obtaining permission from the Owner or FAA, as allowed under the Security Plan.

B. Damage to aircraft, ground equipment, or facilities resulting from hauling or storage of material or other activities in connection with the execution of the contract work, shall be repaired or replaced by the Contractor in as good or better condition as originally found.

C. All construction traffic shall enter and exit the project area through the Airport approved access points, as shown on the Contractor's phasing and work sequence drawings approved and as directed by Airport Operations or representative. Access to the work: will be via the access routes shown on the plans or as directed by Airport Operations or designated representative.

1) The Contractor shall identify access routes with suitable signs, barricades and similar equipment.
2) Contractor will be responsible for security of construction access gates in accordance with the Airport Security Plan.
3) Contractor to provide temporary gate and fencing at perimeter of project areas as needed, and is to be responsible for security, maintenance, and restoration of areas.
4) Gates to the AOA or Security Identification Display Areas (SIDA) must be locked at all times or manned at all times by badged employees of the Contractor.

D. Use of Contractor Vehicles on airport property:

1) Contractor's vehicles used on the Airside portion of the premises must be clearly marked.
2) All vehicles operated on existing pavements to remain shall be rubber tired.
3) All vehicles of the Contractor's forces shall be parked in designated areas only.
4) In the event the Contractor must service his equipment on airport property, all oil and fluids removed from the equipment must be collected and disposed of in accordance with local, state and federal environmental laws. If a hazardous or regulated material is spilled, it must be cleaned up by the Contractor and promptly reported to the Airport.

E. Haul Route: Existing roads used as part of the haul road shall be restored to their original condition after completion of the project, unless noted otherwise. The Contractor will be responsible for daily clean up operations of debris that may be on the haul road.

1) The existing airport pavements, access roads, and haul routes may not be capable of supporting certain types of construction equipment. Prior to submission of the RFQ response, the Contractor shall fully satisfy himself as to the ability of the existing airport pavements to satisfactorily sustain the type of equipment he plans to use. Contractor shall size the equipment used for construction accordingly. As part of the Work, the Contractor shall repair any damage caused by hauling or any other construction activity to existing pavement.
2) It is of specific importance that all aircraft operating areas be kept free of debris due to potential aircraft damage. The Contractor shall police the construction and adjacent site area regularly to assure that no debris creates an endangerment to aircraft. Contractor shall maintain these pavements clean throughout the project.
3) Except where designated on plans or as authorized by Airport Operations or designated representative, Contractor will not be allowed to use any of the existing runways, taxiways, or apron as part of the haul road.
4) The Contractor shall restore any project access route, staging area, waste area, stockpile area and all haul roads to the original condition, including topsoil and seeding, at job completion.

F. The Contractor’s staging area has been preliminarily shown on the drawings for information purposes only. The actual size and location will be determined at the Pre-Construction Conference.

1) All construction material and equipment shall be located and stored in the designated staging area(s) only.
2) The Contractor will be responsible for the daily cleanup and regular disposal of trash and debris created by his work or personnel. Trash and debris must be disposed of offsite.
3) The Contractor will be responsible for the storage and security of his material and equipment and shall erect storage facilities and fencing as necessary. The Contractor’s storage and staging area shall be in the general location(s) shown on the site plan drawing within the Design Documents.

G. Contractor shall control dust at an acceptable level. The Contractor may be required to keep a water supply at the project site during heavy equipment usage areas.

H. Stockpiled material shall be constrained in a manner to prevent movement resulting from aircraft engine blast or wind.

3.3 COMMUNICATIONS AND CONTROLS

A. Contractor shall maintain communication with Airport Operations at all times during construction activity or access in the Aircraft Operations Area (AOA).

1) All access to or through Aircraft Movement Areas shall be by appropriate badged escorting individuals and shall be coordinated in advance with Airport Operations, Airport Operations or designated representative. Vehicles in the Movement Areas shall maintain open communication with the Superintendent and Airport Operations.

2) Approaching, intruding upon, or crossing the taxiways and runways is strictly prohibited.

B. Contractor shall protect existing runway and taxiway lights, signs, and NAVAIDS.

1) Any unplanned, unapproved, or accidental shutdown or interruption of service to any lighting circuit or navigational aid requires immediate notification to Airport Operations and shall be repaired immediately by the Contractor. The cost of materials and labor required to repair the lighting circuit shall be borne by the Contractor.

C. Safety Devices and Barricades: Existing aprons, roadways and parking lots, taxiways and runways outside the limits of construction shall be separated from construction areas with barricades as shown on the Contractor's phasing and work sequence drawings and as directed by Airport Operations or designated representative.

1) Place all barricades and temporary markings at locations as directed by Airport Operations or designated representative. Exact locations will vary depending on aircraft operations, construction schedule and construction operations.
2) Mark and light all open trenches in accordance with FAA AC 150/5270-2, latest edition.
3) Contractors shall locate and maintain all airfield safety devices. Contractor should provide for daily check of required lights and replacement of batteries to ensure correct operations.

D. When the Contract requires the maintenance of vehicular traffic on an existing road, street, or highway during the Contractor's performance of work that is otherwise provided for in the contract, plans, and specifications, the Contractor shall keep such road, street, or highway open to all traffic and shall provide such maintenance as may be required to accommodate traffic. The Contractor shall furnish, erect and maintain barricades, warning signs, flagmen, and other traffic control devices in reasonable conformity with the *Manual of Uniform Traffic Control Devices* for streets and highways unless otherwise specified herein.

E. If the Contractor is given approval to work at night, temporary lighting shall be provided by the Contractor at the work site. Type, direction, number and location of lights shall be submitted not less than ten days in advance for review and approval by Airport Operations or designated representative. Where lighting affects the aircraft apron, it shall be accomplished in a manner to create no hindrance to aircraft, aircraft operations, or the aircraft control tower. Upon notification of any conflict, contractor shall adjust lighting in the field as directed by Airport Operations or designated representative or the Engineer/Architect.

F. Appropriately mark or light all equipment to be operated on the airside area in accordance with FAA AC 150/5210-5D, latest edition. Maximum height of equipment shall be 35 feet depending on the location within Contractor's work limits shown on safety and sequencing plans unless approved by the FAA, and Airport Operations or designated representative. Use of any equipment exceeding this height at any time, will only be during daylight VFR conditions.

G. All vehicles used on the airfield shall meet airport requirements for marking and lighting all equipment. Vehicles shall be marked with rotating yellow beacons or 3 by 3 orange and white flags (if daylight operation only) in accordance with FAA AC 150/5210-5D, latest edition, in addition to company logos and markings identifying each piece of equipment. Advisory Circular may be obtained from the FAA (www.faa.gov).

3.4 SECURITY GATES AND FENCING:

A. Responsibility for Security: The Contractor has the responsibility for maintaining control of the access gates or any other entrance to the AOA within the project work area.

1) The Contractor's method of maintaining security shall be set forth in the Contractor's Security Plan. Deviations or variations from the Contractor's Security Plan must be approved by the Owner, in advance, in writing.
2) Any change, including temporary changes, in operation of existing gates or doors requires advance coordination with Airport Operations or designated representative.
3) The Contractor shall maintain existing gates and access routes in current operation, unless specifically noted otherwise in other parts of the contract documents, drawings, and specifications; or as authorized in writing by Airport Operations or designated representative.
4) The Contractor may utilize a gate guard or install an automatic operated gate controller with limited access with numeric keypad. The Contractor may also use an interlocking pad lock, and the Airport will be provided with a key.

END OF SECTION 01143

SECTION 01210 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:

1) Section 01250, "Contract Modification Procedures"
2) Section 01270, “Unit Prices”
3) Section 01400, “Quality Requirements and Testing Laboratory Services”
4) Item C-100, “Contractor Quality Control Program (CQCP)”
5) Divisions 2 through 16, FAA and FDOT Sections for Items of Work covered by allowances

C. If there is a discrepancy between the requirements of this section and related sections, the more restrictive interpretation shall apply.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.

1) Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:

1) Lump-sum allowances.
2) Unit-cost allowances.
3) Equipment and furnishing allowances.

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise the Owners or the Owner’s designated representative of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At the Owner’s or the Owner’s designated representative request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by the Owner or the Owner’s designated representative from the designated supplier.

1.4 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.6 LUMP-SUM AND UNIT-COST ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner under allowance and shall include taxes, freight, and delivery to Project site.

B. Contractor's costs for receiving and handling at Project site, labor, installation, general conditions, overhead and profit, and similar costs related to products and materials ordered by Owner under allowance shall be included as part of the Contract Sum and not part of the allowance. Labor costs shall be excluded from allowances where noted within the allowance description.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1.7 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1) Include installation costs in purchase amount only where indicated as part of the allowance.
2) If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
3) Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
4) Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1) Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.

2) No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

C. At Project closeout, credit to Owner as a Change Order any remaining unused allowance amounts, including the Contractor's costs for general conditions.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

B. Allowance No. 1: Lobby Seating, Conference Room Seating and Palm Trees – Lump Sum - $140,000.00 Furnish and install passenger and lounge chair seating, powered side tables with charging stations and decorative – preserved palm trees; Manufacturer to be SYNK2 collection (with arms) for the lounge chair seating and side tables with USB/power outlets for charging portable devices. Conference Room Table and chairs to be determined.

C. Allowance No. 2: Permitting and Connection Impact Fees. Lump Sum $85,000.00 – Furnish and provide and procure the permitting fees and connection/impact fees (if any) for the new GA Terminal.

D. Allowance No 3: Gulf Power Allowance – Lump Sum - $20,000.00.

E. Allowance No. 4: Telecommunications Allowance – Lump Sum - $10,000.

END OF SECTION 01210

SECTION 01230 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

B. If there is a discrepancy between the requirements of this section and related sections, the more restrictive interpretation shall apply.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for alternates.

B. The Owner may select any, all, any combination of the alternates, or none of the alternates in the evaluation of the low bidder and award of the contract.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1) The cost or credit for each alternate is the net addition to, or deduction from, the Contract Sum to incorporate Alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the Alternate into Project.

1) Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each Alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

E. Bid Form: For “Add or Deduct Alternates” either the word “Added” or “Deduct” must be circled on the bid form.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. ALTERNATE No. 1 – (Additive)

Airside Apron Components – Furnish and install all work including select demolition, new GA Terminal Airside Apron improvements that are not contiguous to the new GA Terminal, tie-in to existing infrastructure and utilities, permitting fees and other items located on the secure side of the proposed Airport Security fence. This alternate includes the ability to award this scope of work on or before the end of the GA Terminal construction, as funding is available.

B. ALTERNATE No. 2 – (Additive)

Main Entry Covered Canopy at Drop-off – Furnish and install all work including the covered canopy spanning over the vehicular drop-off at the main entry (land side) of the new GA terminal.

C. ALTERNATE No. 3 – (Additive)

Courtyard Enclosure Elements – Furnish and install all work of the Courtyard Enclosure Elements including the screen wall, pavers, tree grates and trellis. The landscaping/ Irrigation, a concrete pad at the entrances and the palm trees shall remain in the base bid if this alternate is not accepted.

D. ALTERNATE No. 4 – (Additive)

Aircraft Hangar - Pre-engineered steel framed aircraft hangar, including site work, foundations, hydraulic hangar door, horizontal ribbed siding, utility tie-in, adjoining site work and all work required for a complete weather tight assembly /hangar. This alternate includes the ability to award this scope of work on or before the end of the GA Terminal construction, as funding is available, and site grading and sodding for the future installation of the hangar if this Alternate is not accepted. The metal siding shall be a four (4) inch ribbed metal siding to match the Terminal Building.

E. ALTERNATE No. 5 – (Additive)

Barn Door in Lieu of Glass Door and Wall – In lieu of the pivot hinge glass door and but glazed fixed glass windows shown at the Meeting Room, furnish and install the custom fabricated barn door with overhead roller as shown on the drawings. The barn door shall have temp glass windows and all required door hardware and support for the overhead track as required to support the door. One door panel will be fixed, and the second door panel will be operable, however the overhead track will be continuous over both doors.

END OF SECTION 01230

SECTION 01250 – CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:

1) General Provision Section 40, “Scope of Work”
2) General Provision Section 50, “Control of Work”
3) General Provision Section 80, “Execution and Progress”
4) General Provision Section 90, “Measurement and Payment”
5) Section 01135, "Weather Delays"
6) Section 01201, “Allowances”

C. If there is a discrepancy between the requirements of this section and related sections, the more restrictive interpretation shall apply.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing and documenting Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: The Owner or Owner’s designated representative will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1) Proposal Requests issued by the Owner or designated representative are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
2) Within **15 days** after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.

1) Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2) Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3) Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4) Include costs of labor and supervision directly attributable to the change.
5) Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6) Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

C. Proposal Request Form: Use AIA Document G709 for Proposal Requests or forms provided by Owner.

1.5 ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, base each Change Order proposal on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1) Include installation costs in purchase amount only where indicated as part of the allowance.
2) If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
3) Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.

4) Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within **15 days** of receipt of the Change Order or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than 15 days after such authorization.

1) Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2) No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on the form to be provided by the Owner.

1.7 CONSTRUCTION CHANGE DIRECTIVE / FIELD DIRECTIVE

A. Construction Change Directive: Upon approval of the Owner, the Architect may issue a Construction Change Directive on AIA Document G714 or form provided by the Owner to expedite the work and alleviate delays. Construction Change Directive instructs Contractor to proceed with a change in the Work immediately for subsequent inclusion in a Change Order.

1) Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1) After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

A. Forms: Sample forms, as listed in articles above, are attached following this Part.

B. Forms are samples only and may be modified by agreement during or after the pre-Construction Conference.

END OF SECTION 01250

CITY OF DEFUNIAK SPRINGS
GENERAL AVIATION CENTER
INFORMATION NOTICE No. IN – ____

DATE: _____

FROM: _____

TO: _____

SUBJECT: _____

SPECIFICATION NO: _____

DRAWING REFERENCE: _____

DESCRIPTION:

_____

_____

_____

_____

_____

Architect or Construction Manager Company _____

Signature: _____

If this notice causes any cost or time impact to your work, do not proceed; submit a Change Proposal (CP) for changes in Contract Sum and/or Time within fifteen (15) days. If this response indicates no change to the Work or a minor change to the Work consistent with the Contract Documents, indicate your acceptance of this notice in the space indicated below and return a copy prior to proceeding.

Accepted By: _____ Date: _____

cc: ARCHITECT
CONTRACTOR
OWNER'S REPRESENTATIVE

CITY OF DEFUNIAK SPRINGS
GENERAL AVIATION CENTER

CHANGE PROPOSAL No. CP – _____

DATE: _____

NOTICE OR REQUEST: **IN** or **IR** No. _____

SUBJECT: _____

DESCRIPTION OF PROPOSED MODIFICATIONS:

_____

_____

REFERENCE:
list any attached documents

_____

_____

Within fifteen (15) days of receiving a related Information Notice or Response to Information Request, submit an itemized proposal for changes in the Contract Sum and/or the Contract Time for the proposed modifications, or within two (2) days of notice of changed conditions, notify the Architect in writing of the date on which you anticipate submitting a Change Proposal.

THIS IS NOT A CONSTRUCTION CHANGE DIRECTIVE. THIS IS NOT A CHANGE ORDER. DO NOT CONSIDER THIS AS INSTRUCTION OR DIRECTION TO EITHER STOP WORK IN PROGRESS OR TO EXECUTE THE PROPOSED MODIFICATIONS. NO PAYMENT WILL BE MADE FOR WORK WHICH IS NOT PRIOR APPROVED IN WRITING.

Adjust Contract Sum for this change (Increase / Decrease)
$ _____

Adjust Contract Time for this change (Increase / Decrease calendar days)
_____

Signed by: _____ Date: _____

Print Name: _____ (CONTRACTOR)

cc: ARCHITECT
CONTRACTOR
OWNER'S REPRESENTATIVE

CITY OF DEFUNIAK SPRINGS
GENERAL AVIATION CENTER

CONSTRUCTION CHANGE DIRECTIVE / FIELD DIRECTIVE No. CCD – _____

SUBJECT: _____

WORK IN PROCESS CHANGE AUTHORIZATION NO.: _____

MAKE THE FOLLOWING MODIFICATIONS TO THE CONTRACT:

_____

_____

_____

_____

Payment for work related to this Construction Change Directive will be:

- ☐ LUMP SUM $_____
- ☐ UNIT PRICE $_____. ____ / _____ (Unit)
- ☐ TIME AND MATERIALS
- ☐ OTHER _____

Contract time will be as follows: _____

Signed by: _____ (ARCHITECT) Date: _____

_____ (OWNER) Date: _____

Construction shall proceed immediately with this Work upon receipt of this **CCD–**_____, if signed by the Owner and the Architect.

Signed by: _____ (CONTRACTOR) Date: _____

Contractor signature indicates agreement with payments and time modifications.

cc: ARCHITECT
CONTRACTOR
OWNER'S REPRESENTATIVE
BUILDING OFFICIAL*

* If required

SECTION 01290 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:

1) General Provision Section 40, “Scope of Work”
2) General Provision Section 50, “Control of Work”
3) General Provision Section 80, “Execution and Progress”
4) General Provision Section 90, “Measurement and Payment”
5) Section 01210, “Allowances”
6) Section 01230, “Alternates”
7) Section 01250, “Contract Modifications”
8) Section 01320, “Construction Progress Documentation”

C. If there is a discrepancy between the requirements of this section and related sections, the more restrictive interpretation shall apply.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

1) Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with Continuation Sheets.
b. Submittals Schedule.
c. Contractor's Construction Schedule.

2) Submit the Schedule of Values to the Owner at earliest possible date but no later than 21 days before the date scheduled for submittal of initial Applications for Payment.

3) Sub schedules: Where the Work is separated into phases requiring separately phased payments, provide sub schedules showing values correlated with each phase of payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section. Provide labor and material breakdowns, and list all allowances and Owner-accepted alternates on as separate line items.

1) Identification: Include the following Project identification on the Schedule of Values:

a. Project name and location and Owner’s name.
b. Name of Architect.
c. Architect's project number.
d. Contractor's name and address.
e. Date of submittal.

2) Submit draft of AIA Document G703 Continuation Sheets.

a. Related Specification Section or Division.
b. Description of the Work.
c. Name of subcontractor.
d. Name of manufacturer or fabricator.
e. Name of supplier.
f. Change Orders (numbers) that affect value.
g. Dollar value.

1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

3) Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate. Include separate line items under required principal subcontracts for operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training in the Contract Sum.
4) Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5) Retain first subparagraph and associated subparagraph below. Strengthen provisions below to protect against undue front-end loading if required.
6) Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.

7) Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

8) Delete subparagraph below if Specifications do not include unit-cost allowances. Do not confuse unit-cost allowances with unit prices. See Evaluations in Division 1 Section "Allowances" for discussion on unit-cost allowances, including potential differences that can occur in dollar amounts between bidders as a result of different procedures in estimating quantities.

9) Allowances and Alternates: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities. List Owner-accepted alternates as separate line items within the Schedule of Values.

10) Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Mobilization, Demobilization, Temporary Facilities and other major cost items that are not direct cost of actual work-in-place shall be shown as separate line items in the Schedule of Values.

11) Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect, and recommended for approval by the DCP authorized/approved and paid for by Owner.

    1) Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of design or construction Work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

    1) Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.

2) Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
3) Submit pencil copy of draft pay application to the Architect for initial review and concurrence with amounts being requested seven (7) days before submittal of notarized originals for processing.
4) Confirm all mathematical calculations and that values on the cover page match the values within pay application back-up.

E. Transmittal: Submit **1 (one)** signed and notarized original copy of each Application for Payment to Architect by a method ensuring receipt. One copy shall include waivers of lien, certified payroll, MBE/SBE certifications of payment amounts, stored material receipts and similar attachments if required.

1) Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

1) Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2) When an application shows completion of an item, submit final or full waivers.
3) Owner reserves the right to designate which entities involved in the Work must submit waivers.
4) Submit final Application for Payment with or proceeded by final waivers from every entity involved with performance of the Work covered by the application that is lawfully entitled to a lien.
5) Delete subparagraph below and insert a specific form or special requirements where predetermined. See Evaluations.
6) Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1) Revise list below to suit Project.
2) List of subcontractors.
3) Schedule of Values.
4) Contractor's Construction Schedule (preliminary if not final).
5) Products list.
6) Schedule of unit prices.
7) Submittals Schedule (preliminary if not final).
8) List of Contractor's staff assignments.
9) List of Contractor's principal consultants.
10) Copies of building permits.
11) Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
12) Initial progress report.
13) Report of preconstruction conference.
14) Certificates of insurance and insurance policies.

H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1) Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2) This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1) Evidence of completion of Project closeout requirements.
2) Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3) Updated final statement, accounting for final changes to the Contract Sum.
4) AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5) AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6) Delete first subparagraph below if a surety is not involved.
7) AIA Document G707, "Consent of Surety to Final Payment."
8) Evidence that claims have been settled.
9) Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
10) Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01290

(INTENTIONALLY LEFT BLANK)

SECTION 01310 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:

1) General Provision Section 30, “Award and Execution of Contract”
2) General Provision Section 40, “Scope of Work”
3) General Provision Section 50, “Control of Work”
4) General Provision Section 80, “Execution and Progress”
5) General Provision Section 90, “Measurement and Payment”
6) Section 01100, “Summary”
7) Section 01210, “Allowances”
8) Section 01320, “Construction Progress Documentation”
9) Section 01700, “Execution Requirements”
10) Section 01770, “Closeout Procedures”

C. If there is a discrepancy between the requirements of this section and related sections, the more restrictive interpretation shall apply.

1.2 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1) Coordination Drawings.
2) Administrative and supervisory personnel.
3) Project meetings.
4) Requests for Interpretation (RFIs).

1.3 DEFINITIONS

A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.4 COORDINATION

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1) Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2) Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
3) Make adequate provisions to accommodate items scheduled for later installation.
4) Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1) Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1) Preparation of Contractor's Construction Schedule.
2) Preparation of the Schedule of Values.
3) Installation and removal of temporary facilities and controls.
4) Delivery and processing of submittals.
5) Progress meetings.
6) Pre-installation conferences.
7) Project closeout activities.
8) Startup and adjustment of systems.
9) Project closeout activities.

1.5 SUBMITTALS

A. Coordination Drawings: Prepare Coordination Drawings including all components where limited space availability necessitates maximum utilization of space for efficient installation of different components and where coordination is required for installation of products and materials fabricated by separate entities.

1) Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:

a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
b. Indicate required installation sequences.
c. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to A/E for resolution of such

conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

2) Sheet Size: At least 11 by 17 inches but no larger than 30 by 42 inches.
3) Number of Copies: Submit three (3) opaque copies and one (1) digital/PDF copy of each submittal. A/E will return one (1) copy.

   a. Submit three (3) copies where Coordination Drawings are required for operation and maintenance manuals. A/E and Owner will retain one (1) copy; remainder will be returned. Mark up and retain one (1) returned copy as a Project Record Drawing, along with a scanned digital PDF copy on a labeled disk
   b. Submit only Contractor-approved and reviewed submittals. Submittals may be stamped on a cover sheet when all pages are sequentially numbered (1 of…, 2 of…, 3 of …, etc.), and labeled within an index.
   c. All submittals and reports shall be submitted to the Owner and RPR concurrently with the A/E submittals.

4) Refer to individual Sections for additional Shop Drawing, Submittals, and Coordination Drawing requirements outlined in those Sections.

B. Key Personnel Names: At least fifteen (15) calendar days to starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, cell, and office telephone numbers. Provide names, addresses, and all telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1) Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.6 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1) Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and A/E of scheduled meeting dates and times.
2) Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3) Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and A/E, within three business days of the meeting.

B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and A/E, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1) Attendees: Authorized representatives of Owner, A/E, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2) Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Phasing.
    c. Critical work sequencing and long-lead items.
    d. Designation of key personnel and their duties; Contractor to submit a list of proposed Subcontractors and contact information.
    e. Procedures for processing field decisions and Change Orders.
    f. Procedures for RFIs.
    g. Procedures for testing and inspecting.
    h. Procedures for processing Applications for Payment.
    i. Distribution of the Contract Documents.
    j. Submittal procedures.
    k. Preparation of Record Documents.
    l. Use of the premises and existing building.
    m. Work restrictions.
    n. FAA Requirements.
    o. Owner's occupancy requirements.
    p. Responsibility for temporary facilities and controls.
    q. Construction waste management and recycling.
    r. Parking availability.
    s. Office, work, and storage areas.
    t. Equipment deliveries and priorities.
    u. First aid.
    v. Security.
    w. Progress cleaning.
    x. Working hours.
    y. The Contractor shall submit a Product Schedule per Section 01330 – submittal Procedures.

3) Minutes: The Contractor, RPR or A/E will record and distribute meeting minutes.

C. Pre-installation Conferences: Conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.

1) Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise A/E of scheduled meeting dates a minimum of fourteen (14) calendar days of the meeting.
2) Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. The Contract Documents.
    b. Options.
    c. Related RFIs.

d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Review of mockups.
i. Possible conflicts.
j. Compatibility problems.
k. Time schedules.
l. Weather limitations.
m. Manufacturer's written recommendations.
n. Warranty requirements.
o. Compatibility of materials.
p. Acceptability of substrates.
q. Temporary facilities and controls.
r. Space and access limitations.
s. Regulations of authorities having jurisdiction.
t. Testing and inspecting requirements.
u. Installation procedures.
v. Coordination with other work.
w. Required performance results.
x. Protection of adjacent work.
y. Protection of construction and personnel.

3) Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4) Reporting: The Contractor will distribute minutes of the meeting to each party present and to parties who should have been present.
5) Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at weekly intervals or as directed by the Owner. Coordinate dates of meetings with preparation of payment requests.

1) Attendees: In addition to the RPR, Owner’s representatives and A/E, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2) Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

2) In advance of the meeting, Contractor shall prepare a narrative two-week look-ahead outline of the work to be completed and the work completed the previous two (2) weeks.

b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Deliveries.
5) Off-site fabrication.
6) Access.
7) Site utilization.
8) Temporary facilities and controls.
9) Work hours.
10) Hazards and risks.
11) Progress cleaning.
12) Quality and work standards.
13) Status of correction of deficient items.
14) Field observations.
15) RFIs.
16) Status of proposal requests.
17) Pending changes.
18) Status of Change Orders.
19) Pending claims and disputes.
20) Documentation of information for payment requests.

3) Minutes: The Contractor or the A/E will record and distribute the meeting minutes to the Contractor and all attendees.
4) Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.

a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

E. Coordination Meetings: Conduct Project coordination meetings at monthly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences.

1) Attendees: In addition to representatives of Owner, A/E and the Contractor, each subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2) Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of

schedule, or behind schedule, in relation to Combined Contractor's Construction Schedule. Determine how construction activities that are behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

b. Schedule Updating: Revise Combined Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.

c. Review present and future needs of each contractor present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Deliveries.
5) Off-site fabrication.
6) Access.
7) Site utilization.
8) Temporary facilities and controls.
9) Work hours.
10) Hazards and risks.
11) Progress cleaning.
12) Quality and work standards.
13) Change Orders.

3) Reporting: The Contractor will record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.7 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.

1) RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
2) Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:

1) Project name.
2) Project identification and tracking numbers.
3) Date.
4) Name of Contractor.
5) Name of A/E.
6) RFI number, numbered sequentially.
7) Specification Section number and title and related paragraphs, as appropriate.

8) Drawing number and detail references, as appropriate.
9) Field dimensions and conditions, as appropriate.
10) Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
11) Contractor's signature.
12) Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.

    a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.

C. Hard-Copy RFIs: CSI Form 13.2A, or other industry-standard form approved as equal by A/E.

1) Identify each page of attachments with the RFI number and sequential page number.
2) Electronic copies are encouraged to minimize paper usage.

D. Software-Generated or Digital RFIs: Scanned software-generated form with substantially the same content as indicated above.

1) Attachments shall be electronic files in Adobe Acrobat PDF format; all documents shall be combined into a single file. Files over 9 megs may be sub-divided and transmitted in multiple emails labeled 1 of 2, 2 of 2, etc.

E. A/E's (or Owner’s when applicable) Action: A/E (or the Owner or Owner’s designated representative when applicable) will review each RFI, determine action required, and return it. Allow ten working days for A/E's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.

1) The following RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for coordination information already indicated in the Contract Documents.
    d. Requests for adjustments in the Contract Time or the Contract Sum.
    e. Requests for interpretation of A/E's actions on submittals.
    f. Incomplete RFIs or RFIs with numerous errors.

2) A/E's (or Owner’s where applicable) action may include a request for additional information, in which case A/E's time for response will start again.
3) A/E's (or Owner’s where applicable) action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 1 Section "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify A/E and the Owner in writing within ten (10) days of receipt of the RFI response.

F. On receipt of A/E's or the Owner’s action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify A/E and the Owner within three (3) days if Contractor disagrees with response.

G. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Software log with not less than the following:

1) Project name.
2) Project identification numbers.
3) Name and address of Contractor.
4) Name and address of A/E.
5) RFI number including RFIs that were dropped and not submitted.
6) RFI description.
7) Date the RFI was submitted.
8) Date A/E's response was received.
9) Retain one of two subparagraphs below. First is for use with AIA Document A201; second is for use with EJCDC Document 1910-8.
10) Identification of related Minor Change in the Work, Construction Change Directive, and Change Proposal Request, as appropriate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01310

CITY OF DEFUNIAK SPRINGS AIRPORT AUTHORITY
GENERAL AVIATION CENTER

REQUEST FOR INFORMATION No. RFI – _____

SUBJECT: _____

SPECIFICATION REF.: _____

DRAWING REF.: _____

DESCRIPTION:

_____

_____

PROPOSED SOLUTION:

_____

_____

COMPANY NAME: _____

Submitted by: _____ Date: _____

RESPONSE:

_____

_____

Signed by A/E: _____ Date: _____

If this response causes any cost or time impact to your work, do not proceed; submit a Change Proposal (CP) for changes in Contract Sum and/or Time within fifteen (15) days. If this response indicates no change to the Work or a minor change to the Work consistent with the Contract Documents, indicate your acceptance of this response in the space indicated below and return a copy prior to proceeding.

Accepted by : _____ Date: _____
Contractor Signature

cc: ARCHITECT/ENGINEER
CONTRACTOR
OWNER'S REPRESENTATIVE

SECTION 01320 – CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:

1) General Provision Section 30, “Award and Execution of Contract”
2) General Provision Section 40, “Scope of Work”
3) General Provision Section 50, “Control of Work”
4) General Provision Section 80, “Execution and Progress”
5) General Provision Section 90, “Measurement and Payment”
6) Section 01100, “Summary”
7) Section 01290, “Payment Procedures”
8) Section 01310, “Project Management”
9) Section 01322, “Photographic Documentation”
10) Section 01330, “Submittal Procedures”
11) Section 01400, “Quality Requirements”
12) Section 01700, “Execution Requirements”
13) Section 01770, “Closeout Procedures”
14) Section 01781, “Project Record Documents”
15) Item C-100, “Contractor Quality Control Program (CQCP)”

C. If there is a discrepancy between the requirements of this section and related sections, the more restrictive interpretation shall apply.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1) Preliminary Construction Schedule.
2) Contractor's Construction Schedule.
3) Submittals Schedule.
4) Daily construction reports.
5) Material location reports.
6) Field condition reports.
7) Special reports.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1) Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
2) Predecessor Activity: An activity that precedes another activity in the network.
3) Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the Schedule of Values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless otherwise approved by the Owner or the Owner's designated representative.

C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Event: The starting or ending point of an activity.

E. Float: The measure of leeway in starting and completing an activity.

1) Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.

2) Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.

3) Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

F. Major Area: A story of construction, a separate building, or a similar significant construction element.

G. Milestone: A key or critical point in time for reference or measurement.

H. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 SUBMITTALS

A. Qualification Data: For scheduling consultant.

B. Submittals Schedule: Submit **three (3)** copies and one digital (pdf.) of schedule. Arrange the following information in a tabular format:

1) Scheduled date for first submittal.
2) Specification Section number and title.

3) Submittal category (action or informational).
4) Name of subcontractor.
5) Description of the Work covered.
6) Scheduled date for A/E's final release or approval.

C. Preliminary Construction Schedule: Submit three (3) opaque copies and one digital (pdf.).

1) Approval of cost-loaded preliminary construction schedule will not constitute approval of Schedule of Values for cost-loaded activities.

D. Contractor's Construction Schedule: Submit three opaque copies of updated schedule, large enough to show entire schedule for entire construction period. Submit update schedule at each progress meeting and with each pay application.

E. Daily Construction Reports: Submit two (2) copies at monthly intervals.

F. Material Location Reports: Submit two (2) copies at monthly intervals.

G. Field Condition Reports: Submit two (2) copies at time of discovery of differing conditions.

H. Special Reports: Submit two (2) copies at time of unusual event; one (1) copy shall be sent directly to the Owner.

1.5 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

1) Secure time commitments for performing critical elements of the Work from parties involved.
2) Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, re-submittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
1) Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.

2) Initial Submittal: Submit concurrently with preliminary bar-chart schedule. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

   a. At Contractor's option, show submittals on the Preliminary Construction Schedule, instead of tabulating them separately.

3) Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.
4) Update the submittal schedule as required or requested by the Owner to reflect updates in the schedule of work.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.

   1) Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:

   1) Activity Duration: Define activities so no activity is longer than 30 days, unless specifically allowed by the Owner or the Owner’s designated representative.
   2) Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 30 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

      a. Door Hardware and Access Control Devices
      b. Roofing Accessories
      c. Wall Coverings
      d. Long lead delivery items or equipment
      e. Lighting Fixtures
      f. Fire and Smoke Detection, Alarm, and Annunciation Systems

   3) Submittal Review Time: Include review and re-submittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
   4) Startup and Testing Time: Include not less than seven days for startup and testing.
   5) Substantial Completion: Indicate completion in advance of date established for Substantial Completion and allow time for A/E's administrative procedures necessary for certification of Substantial Completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule and show how the sequence of the Work is affected.

1) Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
2) Work Restrictions: Show the effect of the following items on the schedule:

    a. Coordination with existing construction.
    b. Limitations of continued occupancies.
    c. Uninterruptible services.
    d. Partial occupancy before Substantial Completion.
    e. Use of premises restrictions.
    f. Provisions for future construction.
    g. Seasonal variations.
    h. Environmental control.

3) Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

    a. Subcontract awards.
    b. Submittals.
    c. Purchases.
    d. Mockups.
    e. Fabrication.
    f. Sample testing.
    g. Deliveries.
    h. Installation.
    i. Commissioning.
    j. Tests and inspections.
    k. Adjusting.
    l. Curing.
    m. Startup and placement into final use and operation.

4) Other Constraints: Separate and Identify Work by project elements and areas within the Terminal Area.

    a. Project elements are headings of work described in the Bid Submittal Form and Instructions to Bidders.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion, and the following interim milestones:

1) Begin and end dates for phases of work within named work areas
2) Erection and removal of temporary fencing and temporary partitions in public areas
3) Limiting access to public entrances
4) Begin and end dates for any work in public areas

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragments to demonstrate the effect of the proposed change on the overall project schedule.

2.3 PRELIMINARY CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Submit preliminary horizontal bar-chart-type construction schedule at least **fourteen days (14) prior** to date established for the Pre-Construction Conference.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first **90** days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's Construction Schedule within ten (10) days of receiving comments from the A/E. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1) For construction activities that require (3) three months or longer to complete, indicate an estimated completion percentage in five percent increments within time bar.

2.5 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1) Revise list below to suit Project.
2) List of subcontractors at Project site.
3) List of separate contractors at Project site.
4) Approximate count of personnel at Project site.
5) Equipment at Project site.
6) Material deliveries.
7) High and low temperatures and general weather conditions, including rainfall.
8) Accidents.
9) Meetings and significant decisions.
10) Unusual events (refer to special reports).
11) Stoppages, delays, shortages, and losses.
12) Meter readings and similar recordings.
13) Emergency procedures.
14) Orders and requests of authorities having jurisdiction.
15) Change Orders received and implemented.
16) Construction Change Directives are used by AIA Document A201. EJCDC Document 1910-8 uses Work Change Directives.
17) Construction Change Directives received and implemented.
18) Services connected and disconnected.

19) Equipment or system tests and startups.
20) Partial Completions and occupancies.
21) Substantial Completions authorized.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.

C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.6 SPECIAL REPORTS

A. General: Submit special reports directly to RPR and Owner within (24) twenty-four hours of an occurrence. Distribute copies of report to parties affected by the occurrence. Distribute copy of special reports to the A/E.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, and response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1) Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2) Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3) As the Work progresses, indicate Actual Completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to A/E, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1) Post copies in Project meeting rooms and temporary field offices.
2) When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01320

SECTION 01322 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:

1) General Provision Section 40, “Scope of Work”
2) General Provision Section 50, “Control of Work”
3) General Provision Section 80, “Execution and Progress”
4) Section 01320, “Construction Progress Documentation”
5) Section 01330, “Submittal Procedures”
6) Section 01770, “Closeout Procedures”

C. If there is a discrepancy between the requirements of this section and related sections, the more restrictive interpretation shall apply.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for the following:

1) Preconstruction photographs.
2) Periodic construction photographs.
3) Final Completion construction photographs.

1.3 SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Include same label information as corresponding set of photographs.

B. Construction Photographs: Submit digital copies, or three prints at Contractor’s option, of each photographic view **within five (5) days** of taking photographs.

1) Digital Images: Submit a complete set of digital image electronic files on CD-ROM. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, un-cropped.
2) Optional Format for Printed Submittals: 8-by-10-inch smooth-surface matte prints on single-weight commercial-grade photographic paper, enclosed back to back in clear plastic sleeves that are punched for standard 3-ring binder.
3) Identification: Include digital information ‘tag’ linked to each image, or on back of each print provide an applied label or rubber-stamped impression with the following information:

a. Name of Project.
b. Name and address of photographer.
c. Name of A/E.
d. Name of Contractor.
e. Date photograph was taken if not date stamped by camera.
f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
g. Unique sequential identifier.

1.4 COORDINATION

A. Auxiliary Services: Cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities, including temporary lighting required to produce clear, well-lit photographs without obscuring shadows.

1.5 USAGE RIGHTS

A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Optional Photographic Film: 35 mm, medium speed (ISO 100-200).

B. Digital Images: Provide images in uncompressed TIFF format, produced by a digital camera with minimum sensor size of 4.0 megapixels, and at an image resolution of not less than 1024 by 768 pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

1) Maintain key plan with each set of construction photographs that identifies each photographic location.

B. Optional Film Images:

1) Date Stamp: Date and time stamp each photograph as it is being taken so stamp is integral to photograph.

2) Field Office Prints: Retain one set of prints of progress photographs in the field office at Project site, available at all times for reference. Identify photographs same as for those submitted to A/E.

C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1) Date and Time: Include date and time in filename for each image.
2) Field Office Images: Maintain one set of images on CD-ROM in the field office at Project site, available at all times for reference. Identify images same as for those submitted to A/E.

D. Preconstruction Photographs: Before starting construction, take color, digital photographs of Project site and surrounding areas, including existing items to remain during construction, from different vantage points, as directed by A/E.

1) Flag construction limits before taking construction photographs.

E. Periodic Construction Photographs: Take twelve (12) color, digital date stamped photographs weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken. Submit two (2) digital copies of all photographs on a labeled CD with each pay application.

F. Final Completion Construction Photographs: Take 24 color, digital photographs after date of Substantial Completion for submission as Project Record Documents. The A/E and the Owner will direct photographer for desired vantage points.

END OF SECTION 01322

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SECTION 01330 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:

1) General Provision Section 30, “Award and Execution of Contract”
2) General Provision Section 40, “Scope of Work”
3) General Provision Section 50, “Control of Work”
4) General Provision Section 80, “Execution and Progress”
5) General Provision Section 90, “Measurement and Payment”
6) Section 01100, “Summary”
7) Section 01290, “Payment Procedures”
8) Section 01310, “Project Management and Coordination”
9) Section 01320, “Construction Progress Documentation”
10) Section 01322, “Photographic Documentation”
11) Section 01400, “Quality Requirements”
12) Section 01770, “Closeout Procedures”
13) Section 01781, “Project Record Documents”
14) Section 01782, “Operation and Maintenance”
15) Section 01820, “Demonstration and Training”
16) Item C-100, “Contractor Quality Control Program (CQCP)”
17) Divisions 2 through 16, FAA and FDOT Sections for specific requirements for submittals in those Sections.

C. If there is a discrepancy between the requirements of this section and related sections, the more restrictive interpretation shall apply.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires A/E's responsive action.

B. Informational Submittals: Written information that does not require A/E's responsive action. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

A. General: Electronic copies of CAD Drawings of the Contract Drawings will **not** be provided by the Owner or the A/E for Contractor's use in preparing submittals, without the Contractor's signed release.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities,

1) Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2) Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. A/E and the Owner reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

3) All submittals (drawings and samples) shall be submitted by the Contractor to the A/E, RPR and the Owner or Owner's designated representative concurrently. The Architect/Engineer of Record will be responsible for incorporating the Owner's submittal review comments prior to returning the submittal to the Contractor.

a. All finishes and mock ups shall be submitted to the Owner (or Owner's designated representative) for review and acceptance prior to ordering materials and starting the work.
b. All substitution requests shall be submitted to the Owner (or Owner's designated representative) for approval prior to ordering materials and starting the work.

C. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.

D. Processing Time: Allow enough time for submittal review, including time for re-submittals, as follows. Time for review shall commence on A/E's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including re-submittals.

1) Initial Review: Allow twenty-one (**21)** days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. A/E or the Owner will advise Contractor when a submittal being processed must be delayed for coordination.
2) Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3) Resubmitted Review: Allow fifteen (15) days for review of each resubmitted.
4) Sequential Review: Where sequential review of submittals by A/E's consultants, Owner, or other parties is indicated, allow twenty-eight (28) days for initial review of each submittal.

a. Safety and Security Plans
b. Phasing and Staging Plans

c. Door Hardware and Access Control Devices
d. Lighting Fixtures
e. Data and Communication – wiring and conduits
f. Fire Sprinklers
g. Mechanical Systems
h. Plumbing Systems

E. Identification: Place a permanent label or title block on each submittal for identification.

1) Indicate name of firm or entity that prepared each submittal on label or title block.
2) Provide a space approximately **6 by 4 inches** on label or beside title block to record Contractor's review and approval markings and action taken by Architect or Engineer.
3) Include the following information on label for processing and recording action taken:

a. Project name.
b. Project Identification Numbers – To include project numbers assigned by the FAA, FDOT, Owner and A/E
c. Date.
d. Name and address of A/E.
e. Name and address of Contractor.
f. Name and address of subcontractor.
g. Name and address of supplier.
h. Name of manufacturer.
i. Submittal number or other unique identifier, including revision identifier.

1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01). Re-submittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.A).

j. Number and full title of appropriate Specification Section.
k. Drawing number and detail references, as appropriate.
l. Drawing Index on the cover page.
m. Location(s) where product is to be installed, as appropriate.
n. Other necessary identification.

F. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.

G. Additional Copies: Unless additional copies are required for final submittal, and unless A/E observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

1) Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.

H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. A/E will return submittals, without review, received from sources other than Contractor.

1) Transmittal Form: Provide locations on form for the following information:

   a. Project name.
   b. Date.
   c. Destination (To:).
   d. Source (From:).
   e. Names of subcontractor, manufacturer, and supplier.
   f. Category and type of submittal.
   g. Submittal purpose and description.
   h. Specification Section number and title.
   i. Drawing number and detail references, as appropriate.
   j. Number of pages included with each submittal item.
   k. Transmittal number.
   l. Submittal and transmittal distribution record.
   m. Remarks.
   n. Signature of transmitter.

2) On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by A/E on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.

I. Re-submittals: Make re-submittals in same form and number of copies as initial submittal.

1) Note date and content of previous submittal.
2) Note date and content of revision in label or title block and clearly indicate extent of revision.
3) Resubmit submittals until they are marked "No Exceptions," “Approved,” or “Approved as Noted.”

J. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, and installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

K. Use for Construction: Use only final submittals with mark indicating "No Exceptions," “Approved,” or “Approved as Noted” by the A/E.

1.5 CONTRACTOR'S USE OF OWNER’S OR A/E’S CAD FILES

A. General: Electronic copies of CAD Drawings of the Contract Drawings will **not** be provided by the Owner or A/E for Contractor's use in preparing submittals.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections. All submittals shall be reviewed, approved, and stamped by the Contractor prior to submittal to the A/E and Owner for review. All page numbers shall be sequentially numbered. DO NOT SUBMIT PRODUCT SAFETY DATA SHEETS. THESE WILL NOT BE REVIEWED AND SHALL BE RETURNED TO THE CONTRACTOR.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1) If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2) Mark each copy of each submittal to show which products and options are applicable.
3) Include the following information, as applicable:

a. Manufacturer's written recommendations.
b. Manufacturer's product specifications.
c. Manufacturer's installation instructions.
d. Standard color charts.
e. Manufacturer's catalog cuts.
f. Wiring diagrams showing factory-installed wiring.
g. Printed performance curves.
h. Operational range diagrams.
i. Mill reports.
j. Standard product operation and maintenance manuals.
k. Compliance with specified referenced standards.
l. Testing by recognized testing agency.
m. Application of testing agency labels and seals.
n. Notation of coordination requirements.

4) Submit Product Data before or concurrent with Samples.
5) Number of Copies: Submit not less than three (3) copies and one (1) digital pdf. of Shop Drawings and Product Data, unless otherwise indicated, submit four (4) copies and one (1) digital pdf. File for submittals involving consulting engineering or design professionals The A/E and the Owner will keep the submitted copies, for most submittals, and will return one digital (PDF) copy with comments. The A/E shall incorporate the Owner’s review comments into a composite submittal and return the composite submittal to the Contractor. The Contractor shall mark up and retain the returned copy of the Shop Drawings and samples with the Contractor’s Shop Drawing Log as a Project Record Document, to be submitted to the Owner at project closeout. The A/E shall coordinate with the Owner or the Owner’s designated representative on any review comments prior to returning the submittal to the Contractor.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1) Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Dimensions.
b. Identification of products.
c. Fabrication and installation drawings.
d. Roughing-in and setting diagrams.
e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
f. Shop work manufacturing instructions.
g. Templates and patterns.
h. Schedules.
i. Design calculations.
j. Compliance with specified standards.
k. Notation of coordination requirements.
l. Notation of dimensions established by field measurement.
m. Relationship to adjoining construction clearly indicated.
n. Seal and signature of professional engineer if specified.
o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
p. Page number and total page count.

2) Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.
3) Number of Copies: Submit one (1) opaque (bond) copy of each submittal and one (1) digital pdf file. A/E will return one digital copy of the composite shop drawings with the A/E's and Owner's review comments to the Contractor.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1) Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2) Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of appropriate Specification Section.
e. Project name.
f. Proposed location, or use, in project.
g. Contractor's approval stamp and room for A/E's stamp.

3) Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4) Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

a. Number of Samples: Submit two (2) full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. A/E will return submittal with options selected and accepted by the Owner.

1) Submit one full set to the office of the A/E.
2) Submit one full set on-site to the Owner or Designated Representative.

5) Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: Submit not less than **three (3)** sets of Samples. A/E will retain **two** (2) Sample sets; remainder will be returned.

1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary spread sheet and supporting documentation indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1) Type of product. Include unique identifier for each product.
2) Number and name of room or space.
3) Location within room or space.
4) Number of Copies: Submit three (3) copies of product schedule or list, unless otherwise indicated. A/E will return one (1) copy.
5) Product Manufacturer’s distance from project site.
6) Products percentage (%) of recycled material content.

F. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation" for Contractor’s action.

G. Submittals Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."

H. Application for Payment: Comply with requirements specified in Division 1 Section "Payment Procedures."

I. Schedule of Values: Comply with requirements specified in Division 1 Section "Payment Procedures."

J. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1) Name, address, and telephone number of entity performing subcontract or supplying products.
2) Number and title of related Specification Section(s) covered by subcontract.
3) Drawing number and detail references, as appropriate, covered by subcontract.
4) Number of Copies: Submit two (2) copies of subcontractor list, unless otherwise indicated. A/E will return one (2) copy.

a. Mark up and retain one returned copy as a Project Record Document.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1) Number of Copies: Submit three (3) copies of each submittal, unless otherwise indicated. A/E will not return copies.
2) Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
3) Test and Inspection Reports: Comply with requirements specified in Division 1 Section "Quality Requirements."

B. Coordination Drawings: Comply with requirements specified in Division 1 Section "Project Management and Coordination."

C. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."

D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

H. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

I. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

J. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

K. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

L. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1) Name of evaluation organization.
2) Date of evaluation.
3) Time period when report is in effect.
4) Product and manufacturers' names.
5) Description of product.
6) Test procedures and results.
7) Limitations of use.

M. Schedule of Tests and Inspections: Comply with requirements specified in Division 1 Section "Quality Requirements."

N. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

O. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

P. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either

during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

Q. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section "Operation and Maintenance Data."

R. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

S. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1) Preparation of substrates.
2) Required substrate tolerances.
3) Sequence of installation or erection.
4) Required installation tolerances.
5) Required adjustments.
6) Recommendations for cleaning and protection.

T. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1) Name, address, and telephone number of factory-authorized service representative making report.
2) Statement on condition of substrates and their acceptability for installation of product.
3) Statement that products at Project site comply with requirements.
4) Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5) Results of operational and other tests and a statement of whether observed performance complies with requirements.
6) Statement whether conditions, products, and installation will affect warranty.
7) Other required items indicated in individual Specification Sections.

U. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

V. Construction Photographs: Comply with requirements specified in Division 1 Section “Photographic Documentation."

W. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to A/E.

1) A/E will not review submittals that include MSDSs and will return the entire submittal without comment.

2.3 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1) If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to A/E.

2) Where submittals require “sign and sealed” engineered documents; the submittal shall be “signed and sealed” by an engineer licensed within the State of the project location.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three (3) copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional licensed in the State where the work is to be performed.

1) Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW AND APPROVAL

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to A/E and the Owner.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT/ENGINEER'S ACTION

A. General: A/E and Owner will not review submittals that have not been reviewed by the Contractor and do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: A/E will review each submittal, make marks to indicate corrections or modifications required, noted coordinate any Owner review comments and return the submittal to the Contractor. A/E will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1) "No Exceptions" – A/E has reviewed the submittal and approved that it generally conforms to the referenced specification(s) and drawings.
2) "Exceptions Noted" – A/E has reviewed the submittal and observed discrepancies in conformance to the referenced specification(s) and drawings; A/E's comments shall be incorporated prior to fabrication. Contractor shall modify and re-submit number of corrected copies requested as record documents.
3) "Revise and Resubmit" –The submittal was found to be unacceptable, and the A/E has noted discrepancies with the Contract Documents. The Contractor shall respond to the noted discrepancies and shall revise the submittal to conform to the specification(s) and drawings before proceeding further.
4) "Rejected" – The submittal is unacceptable. Contractor shall review the Contract Documents and prepare a submittal that conforms to the specifications and drawings.

C. Informational Submittals: A/E will review each submittal and will not return it or will return it if it does not comply with requirements. A/E will forward each submittal to appropriate party.

D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 01330

SECTION 01400 - QUALITY REQUIREMENTS AND TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:

1) Section 01320, “Construction Progress Documentation”
2) Item C-100, “Contractor Quality Control Program (CQCP)”
3) Divisions 2 through 16, FAA and FDOT Sections for specific test and inspection requirements, for descriptions of respective certificates of products, and for lists describing tests and standards.

C. If there is a discrepancy between the requirements of this section and related sections, the more restrictive interpretation shall apply.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1) Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2) Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3) Requirements for Contractor to provide quality-assurance and -control services required by A/E, Owner, or Authorities Having Jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by A/E or the Owner or Owner's designated representative.

C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.

D. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by a NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1) Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

J. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of (3) **three** previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1) If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to A/E.

1.5 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the **most stringent** requirement. Refer uncertainties and requirements that are different, but apparently equal, to A/E for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to A/E for a decision before proceeding.

1.6 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1) Specification Section number and title.
2) Description of test and inspection.
3) Identification of applicable standards.
4) Identification of test and inspection methods.
5) Number of tests and inspections required.
6) Time schedule or time span for tests and inspections.
7) Entity responsible for performing tests and inspections.
8) Requirements for obtaining samples.
9) Unique characteristics of each quality-control service.

C. Reports: Prepare and submit five (5) certified written reports that include the following:

1) Date of issue.
2) Project title and number.
3) Name, address, and telephone number of testing agency.
4) Dates and locations of samples and tests or inspections.
5) Names of individuals making tests and inspections.
6) Description of the Work and test and inspection method.
7) Identification of product and Specification Section.
8) Complete test or inspection data, including type.
9) Test and inspection results and an interpretation of test results.
10) Record of temperature and weather conditions at time of sample taking and testing and inspecting.

11) Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12) Name and signature of laboratory inspector.
13) Recommendations on retesting and reinspecting.

D. Testing Laboratory: Prepare and submit 5 copies of the following to be included with the Reports indicated above:

1) Certificate(s) of Calibration, made by accredited calibration agency.

2) Written reports on irregularities, deficiencies and/or re-tests (color-coded as per Article 1.8 following).

3) Reports on inspections and tests.

4) Copy of report of inspection of facilities made by Materials Reference Laboratory of National Bureau of Standards during most recent tour of inspection; with memorandum of remedies of any deficiencies reported by inspection.

E. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

F. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement, signed and sealed by the responsible Design Professional, for each product and system specifically assigned to Contractor to be designed or certified by a Design Professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.7 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

E. Professional Engineer Qualifications: A Professional Engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing

engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1) Requirement for specialists shall not supersede building codes and regulations governing the Work.

G. Testing Agency Qualifications: Meet “Recommended Requirements for Independent Laboratory Qualification”, latest edition, published by American Council of Independent Laboratories.

1) Testing Equipment:

a. Calibrated at maximum twelve (12) month intervals by devices of accuracy traceable to either:

1) National Bureau of Standards.
2) Accepted values of natural physical constants.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1) Build mockups in location and of size indicated or, if not indicated, as directed by A/E.
2) Notify A/E and Owner twenty-one (21) days in advance of dates and times when mockups will be constructed.
3) Demonstrate the proposed range of aesthetic effects and workmanship.
4) Obtain A/E's and Owner’s approval of mockups before starting work, fabrication, or construction.
   a. Allow twenty-one (21) days for initial review and fifteen (15) days for each re-review of each mockup.
5) Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6) Demolish and remove mockups when directed, unless otherwise indicated.

1.8 QUALITY CONTROL

A. Contractor Responsibilities: Contractor is responsible for quality control testing and inspection to insure the quality of his means and methods of construction will produce

the specified quality of work, and for any tests and inspections required by regulatory agencies. Costs for these services shall be included in the contract sum.

B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

7) Retain subparagraph below if some Sections require an independent testing agency to perform certain tests and inspections.

a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

8) The Contractor shall submit for Engineer’s and Owner’s acceptance a Quality Control (QC) Plan delineating his methods for each item requiring inspections, tests, and similar services.
9) Notify testing agencies at least 72 hours in advance of time when Work that requires testing or inspecting will be performed.
10) Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
11) Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
12) Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 1 Section "Submittal Procedures."

D. Retesting/Reinspecting:

1) Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
2) Retest Responsibility: Where results of required inspections, tests, or similar services prove unsatisfactory and do not indicate compliance with the requirements of the Contract Documents, then retests are the responsibility of the Contractor, and shall be deducted from monies due the Contractor on his monthly pay request, regardless of whether the original test was the Contractor's responsibility. Retesting of work revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original work.

E. Testing Agency Responsibilities: Cooperate with A/E, Owner, and Contractor in performance of duties. On notice, provide qualified personnel to perform required tests and inspections.

1) Perform specified inspections, sampling and testing of materials.

a. Comply with specified standards.

b. Ascertain compliance with requirements of Contract Documents.

2) Promptly notify A/E and Contractor of irregularities or deficiencies observed in the Work during performance of its services.

a. Deficient work shall be reported and printed on Yellow paper.
b. Re-tests shall be reported and printed on Blue paper.

3) Determine the location from which test samples will be taken and in which in-situ tests are conducted.
4) Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
5) Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
6) Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
7) Do not perform any duties of Contractor.
8) Perform additional services requested by A/E.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel and scheduling of tests. Provide the following:

1) Access to the Work.
2) Incidental labor and facilities necessary to facilitate tests and inspections.
3) Required quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4) Furnish copies of all test reports as called for by the Specifications.
5) Furnish labor and facilities:

a. To provide access to work to be tested.
b. To obtain and handle samples at the site.
c. To facilitate inspections and tests.
d. Test cylinder cure box for laboratory’s exclusive use for storage and curing of test samples.

6) Arrange with Laboratory and pay for additional samples and tests required for Contractor’s convenience.
7) Employ and pay for services of a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required when initial tests indicate work does not comply with Contract Documents. See Article above for additional requirements regarding re-testing and/or re-inspection.
8) Facilities for storage and field curing of test samples.
9) Delete first subparagraph below if not required or common practice in Project vicinity.
10) Delivery of samples to testing agencies.
11) Preliminary design mix proposed for use for material mixes that require control by testing agency.
12) Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1) Schedule times for tests, inspections, obtaining samples, and similar activities.

H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 45 days of date established for the Notice to Proceed.

1) Distribution: Distribute schedule to Owner, A/E, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.9 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified special inspector to conduct special tests and inspections required by Authorities Having Jurisdiction as the responsibility of Owner, and as follows:

1) Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2) Notifying A/E and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3) Submitting a certified written report of each test, inspection, and similar quality-control service to A/E with copy to Contractor and to authorities having jurisdiction.
4) Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5) Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6) Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Prepare a record of tests and inspections. Include the following:

1) Date test or inspection was conducted.
2) Description of the Work tested or inspected.
3) Date test or inspection results were transmitted to A/E.
4) Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for A/E's reference during normal working hours.

END OF SECTION 01400

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SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:

1) General Provision Section 50, “Control of Work”
2) General Provision Section 70, “Legal Regulations and Responsibility to Public”
3) General Provision Section 80, “Execution and Progress”
4) Section 01100, “Summary”
5) Section 01143, “Airport Project Work Procedures”
6) Item C-105, “Mobilization”

C. If there is a discrepancy between the requirements of this section and related sections, the more restrictive interpretation shall apply.

1.2 SUMMARY

A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities and security and protection facilities.

1.3 USE CHARGES

A. General: Cost or use charges for temporary facilities shall be included in the Contract Lump Sum for Mobilization. Allow other entities to use temporary services and facilities without cost, including, but not limited to, A/E, testing agencies, and Authorities Having Jurisdiction.

B. Sewer Service: Pay sewer service use charges for sewer usage by all entities for construction operations.

C. Water Service: Pay water service use charges for water used by all entities for construction operations.

D. Electric Power Service: Pay electric power service use charges for electricity used by all entities for construction operations. Provide connections and extensions of services as required for construction operations.

E. Telephone, Data, and Fiber Services: Pay telephone, data and fiber service use charges for telephone, data and fiber used by all entities for construction operations. Provide connections and extensions of services as required for construction operations.

1.4 SUBMITTALS

A. Temporary Utility Reports: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.

B. Site Plan: Show temporary facilities, utility hookups, staging areas, parking areas for construction personnel, and parking facilities to remain operational.

C. Erosion and Sedimentation-Control Plan: Show compliance with requirements of NPDES and SWPPP or authorities having jurisdiction, whichever is more stringent.

D. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.

1) Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
2) Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
3) Indicate sequencing of work that requires water, such as sprayed fire-resistive materials or plastering, and/or concrete and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

E. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1) Locations of dust-control partitions at each phase of work.
2) HVAC system isolation schematic drawing.
3) Location of proposed air-filtration system discharge.
4) Waste handling procedures.
5) Other dust-control measures.

1.5 QUALITY ASSURANCE

A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.

1) Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.
2) Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for Authorities Having Jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

A. Temporary Utilities: At earliest feasible time, when approved in writing from the A/E, change over from use of temporary service to use of permanent service.

1) Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

B. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:

1) Keep temporary services and facilities clean and neat.
2) Relocate temporary services and facilities as required by progress of the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by A/E. Provide materials suitable for use intended.

2.2 TEMPORARY FACILITIES

A. General Contractor Field Offices, General: Prefabricated of mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by RPR. Provide materials suitable for use intended.

2.3 EQUIPMENT

A. Field Secure Storage Trailer: Mobile units with lockable entrances located as directed by Owner for storage of materials, equipment, and tools.

B. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.

1) Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

C. Self-Contained Toilet Units – For Contractor forces: Single-occupant units of chemical, aerated recirculation or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

D. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work only in locations designated in drawings. Relocate and modify facilities as required.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. Temporary electrical power consumption and utilities shall be provided by General Contractor. Temporary sewer connections will be required for modular offices for this project. Any costs for providing temporary utilities and removal of the temporary connection and restoring the site to pre-connection condition, will solely be the General Contractor's/Bidder's responsibility.

B. Water Service: Temporary water service shall be provided by General Contractor and maintained in a condition acceptable to permitting agencies and the owner. At Substantial Completion, restore these facilities to condition existing before initial use.

1) Provide rubber hoses as necessary to serve Project site.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.

1) Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.

2) Construction Personnel Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Provide separate facilities for male and female personnel.

3) Drinking-Water Facilities: Provide bottled-water drinking-water units.

a. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F.

D. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include

meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear.

E. Telephone and Data Service: Provide temporary telephone and data service in common-use facilities for use by all construction personnel and RPR facilities. Install at least one telephone and data line for each field office.

1) Provide additional telephone lines for the following:

a. Provide a dedicated telephone line for each computer in each field office.

2) At each telephone, post a list of important telephone numbers including:

a. Police and fire departments.
b. Ambulance service.
c. Contractor's Safety Officer mobile phone or pager.
d. Superintendent's mobile phone.
e. Contractor's home office.
f. Architect's office.
g. Engineer's office.
h. Owner's Representative Office.
i. Principal subcontractors' field and home offices.

3) Provide a voice-mail service on superintendent's telephone.
4) Provide superintendent with cellular telephone and portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1) Locate storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access only in areas designated in drawings.
2) Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.
3) Review first subparagraph below with Owner's insurance carrier. Revise to suit Project.
4) Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities under conditions acceptable to Owner.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1) Protect existing site improvements to remain including fence, pavement, and utilities.
2) Maintain access for fire-fighting equipment and access to fire hydrants.
3) Coordinate with Owner during progress of construction to coordinate with roadway improvement projects adjacent to temporary facilities and staging areas.
4) Refer to other sections of these specifications for additional requirements for aircraft and vehicular traffic control requirements.

C. Parking: Use areas designated by Owner for construction personnel parking.

D. Project Identification and Temporary Signs: Provide Project identification and other signs. Install signs where directed by RPR, Owner or A/E to inform public and individuals seeking entrance to Project. See Phasing and Staging drawings for additional information. Do not permit installation of unauthorized signs.

1) Provide temporary, directional signs for construction personnel and visitors.
2) Engage an experienced sign painter or fabricator to apply graphics.
3) Signs shall be sized appropriate for required message and intended audience (i.e., vehicular or pedestrian traffic). Location identification (Parking, Deliveries Entrance, etc.) and vehicular signage text shall use sans serif text with minimal character height of at least 3-inch.
4) Maintain and touchup signs so they are legible at all times.
5) Exterior signs:

a. Construct of exterior-type Grade B-B plywood at least ½" thick.
b. Support on posts or framing of preservative-treated wood or steel.
c. For signs to remain more than 90 days, mount posts in poured concrete footings, where directed by Owner.
d. Paint sign panels and applied graphics with exterior-grade alkyd gloss enamel over exterior primer. Allow for up to three colors for signs.

6) Project Identification Sign

a. Message shall be as directed by the Owner and shall include a rendering of the Terminal.
b. Allow for sign up to 8' x 8' (2440 mm x 2440 mm), securely anchor on not less than three posts.
c. Allow for up to three colors for Project Identification sign.
d. As requested by A/E or the Owner, provide company logos and identification information for Contractor and major subcontractors and suppliers for incorporation into Project Sign.

E. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.

1) Comply with Division 1 Section "Airport Project Work Procedures" for policing of debris, hourly, and daily removal of loose material, waste, and potential debris.
2) Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.

F. Lifts and Hoists: Provide facilities for hoisting materials and personnel. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near Project site.

B. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1) Extent of Fence: As required to enclose portion of Project site determined sufficient to accommodate construction operations, roughly in areas indicated on Phasing and Staging Drawings for each phase.
2) Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with two sets of keys.
3) Set fence posts at eight feet on center maximum.
4) Provide gates in sizes and at locations necessary to accommodate delivery vehicles and other construction operations.
5) Cost of Site Enclosure Fence shall be paid for under Item C-105, “Mobilization.”

C. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

1) Comply with Division 1 Section “Airport Project Work Procedures”.

E. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1) Provide fire extinguishers, installed on walls on mounting brackets, visible and accessible from space being served, with sign mounted above.

a. Class ABC dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for exposures.

2) Store combustible materials in containers in fire-safe locations.
3) Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting.
4) Prohibit smoking in hazardous fire-exposure areas. Prohibit smoking in construction areas. Smoking is prohibited at all times inside the within and a perimeter of 100 ft of the construction area of the new building; in covered areas under and around the existing terminal building, at all times and all locations on the airside and in the aircraft operations area.

5) Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
6) Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
7) Comply with requirements of Division 1 Section “Airport Project Work Procedures”.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.

1) Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
2) Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1) At Substantial Completion, clean and renovate permanent facilities used during construction period.

END OF SECTION 01500

SECTION 01560 - TEMPORARY BARRIERS AND ENCLOSURES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:

1) Section 01100, “Summary”
2) Section 01143, “Airport Project Work Procedures”
3) Section 01500, “Temporary Facilities and Controls”
4) Item C-105, “Mobilization”

C. If there is a discrepancy between the requirements of this section and related sections, the more restrictive interpretation shall apply.

1.2 SECTION INCLUDES

A. Temporary construction barriers, enclosures, and fencing.

1) Security barriers

B. Protection of completed Work.

C. Removal of construction facilities and temporary controls

1.4 CODES AND REGULATIONS

A. Florida Building Code (FBC): Comply with Florida Building Code (FBC)

B. Fire Regulations: Comply with requirements of fire Authorities Having Jurisdiction, including Florida Fire Prevention Code (FFPC).

C. Safety Regulations: Comply with requirements of all applicable Federal, State and Local safety rules and regulations. The Contractor shall be solely responsible for jobsite safety.

D. Barricades and Barriers: As required by governing Authorities Having Jurisdiction, provide temporary barriers, guardrails and enclosures around Work areas and adjacent to embankments and excavations for protection of workers and the public.

1.5 PROTECTION OF EXISTING CONDITIONS

A. Protection of Adjacent Facilities: The Contractor shall restrict Work to limits or areas indicated on the Drawings and as specified in Section 01100 – Summary of the Work: Protect existing, adjacent facilities and existing finishes from damage, including soiling and debris accumulation.

1.6 MAINTENANCE OF CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

A. Maintenance: Use all means necessary to maintain temporary barriers and enclosures in proper and safe condition throughout progress of the Work, and in a condition acceptable to the owner and authorities. This shall include all life safety systems within occupied areas of the building.

B. Replacement: In the event of loss or damage, promptly restore temporary barriers and enclosures by repair or replacement at no change in the Contract Sum or Contract Time.

1.7 TEMPORARY BARRIERS, AND ENCLOSURES

A. Temporary Barriers, General: Provide temporary fencing, barriers and guardrails as necessary to provide for public safety, to prevent unauthorized entry to construction areas and to protect existing facilities from damage from construction operations and the elements where finished areas temporarily are exposed to the exterior or non-conditioned space.

1) Note the requirements for continued occupancy and use of existing buildings and site areas (T-Hangars) during construction as outlined by the scope of work; the airfield will remain active.
2) Comply with applicable requirements of Florida Building Code (FBC) and Authorities Having Jurisdiction, FAA, including industrial and construction safety regulations.
3) Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities and access routes for firefighting.
4) Where appropriate and necessary, provide traffic control and lighting, including flashing red or amber lights as warning devices.

C. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.

D. Barricades, Warning Signs and Lights, General: Comply with standards and code requirements for erection of structurally adequate barricades. Paint barricades with appropriate colors, graphics and warning signs to inform personnel and the public when protecting the public and personnel against a hazard. Where appropriate and needed provide lighting, including flashing red or amber lights as warning devices.

E. Security Closures and Lockup: Provide substantial temporary closures of openings in exterior surfaces and interior areas as appropriate to prevent unauthorized entrance, vandalism, theft and similar violations of security. Provide doors with self-closing hardware and locks, keyed to the building master keying system, and provide card reader and key pad access control and electrical locks to separate secured and non-secured areas of the Airport and AOA. Coordinate with Airport Operations for temporary tie-in’s to the Airport security system and network.

1) Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

F. Weather Closures: Provide temporary weather-tight closures at exterior openings to prevent intrusion of water, to create acceptable working conditions, to protect completed Work and to maintain temporary heating, cooling and ventilation. Provide access doors with self-closing hardware and locks.

PART 2 – PRODUCTS

Not applicable to this Section.

PART 3 – EXECUTION

3.1 PROTECTION OF INSTALLED WORK

A. Protection of Installed Work, General: Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.

B. Protective Coverings: Provide protective coverings at walls, projections, jambs, sills, and soffits of openings as necessary to prevent damage from construction activities, such as coatings applications finishes new work, and as necessary to prevent other than normal atmospheric soiling.

C. Traffic Protection:

1) Protect finished floors and other surfaces from traffic, soiling, wearing and marring.
2) Provide temporary covers of plywood, reinforced kraft paper or temporary rugs and mats, as necessary. Temporary covers shall not slip or tear under normal use.
3) Protect newly fine graded, areas with barriers and flags to designate such areas as closed to pedestrian and vehicular traffic.

3.2 REMOVAL OF TEMPORARY BARRIERS AND ENCLOSURES

A. Removal of Temporary Barriers and Enclosures: Unless otherwise mutually agreed by Owner or Owner’s designated representative and the Contractor, remove temporary materials, equipment, services, and construction prior to Project Completion. Coordinate removal with requirements specified in Section 01500 – Temporary Facilities and Controls, and this Section 01560 – Temporary Barriers and Enclosures.

B. Cleaning and Repairs: Clean and repair damage, soiling and marring caused to new construction by use of temporary barriers and enclosures or due to exposure to water intrusion from the exterior elements.

END OF SECTION 01560

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SECTION 01600 - MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:

1) General Provision Section 90, “Measurement and Payment”
2) Section 01210, “Allowances”
3) Section 01230, “Alternates”
4) Section 01770, “Closeout Procedures”
5) Divisions 2 through 16, FAA and FDOT Sections for specific requirements for warranties on products and installations specified to be warrantied.

C. If there is a discrepancy between the requirements of this section and related sections, the more restrictive interpretation shall apply.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

1.3 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1) Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2) New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
3) Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.4 REQUIREMENTS:

A. Material, Equipment, and Products Incorporated in to the Work shall conform to applicable specifications and standards; shall comply with size, make, type and quality specified, or as specifically approved in writing by the Architect; and shall not be used for any purpose other than that for which it is designed or is specified.

B. Manufactured and Fabricated Products shall be designed, fabricated and assembled in accordance with the best engineering and shop practices. Like parts of duplicate units shall be manufactured to standard sizes and gages, to be interchangeable. Products shall be suitable for service conditions. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless Architect specifically approves variations in writing.

C. Standardization: Unless otherwise approved by the Architect, items and equipment of a similar type and function shall be furnished by one manufacturer to standardize on replacement parts, service calls, operation and maintenance matters, and to avoid a division of responsibility among several manufacturers.

D. A single supplier shall be used on principal items of equipment and systems where one or more components are not manufactured by the principal supplier; this is required to place performance and service responsibilities for the entire unit or system with only one supplier or manufacturer.

1.5 SUBMITTALS

A. Product List: Submit a list, in tabular from, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.

1) Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
2) Form: Tabulate information for each product under the following column headings:

a. Specification Section number and title.
b. Generic name used in the Contract Documents.
c. Proprietary name, model number, and similar designations.
d. Manufacturer's name and address.

e. Supplier's name and address.
f. Installer's name and address.
g. Projected delivery date or time span of delivery period.
h. Identification of items that require early submittal approval for scheduled delivery date.

3) Completed List: Within thirty (30) days after date of Pre-Construction Conference, submit five copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
4) Owner's Action: The Owner or Owner's designated representative will respond in writing to Contractor within 15 days of receipt of completed product list. The Owner's or Owner's designated representative's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. The Owner's or Owner's designated representative's response, or lack of response, does not constitute a waiver of requirement to comply with the Contract Documents.

B. Product Substitutions: Contractor shall submit all requests for product substitutions. No requests for substitutions will be accepted from manufacturers or suppliers.

Submit a separate written request for each product, supported with complete data, with drawings and samples as appropriate, including:

1) Substitution Request Form: Use form enclosed in the specifications; included at end of this section.
2) Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified material or product cannot be provided.
b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
j. Cost information, including a proposal of change, if any, in the Contract Sum.

1) Include cost data comparing the proposed substitution with the product specified.

k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
m. Any required license fees or royalties.
n. Availability of maintenance service, and source of replacement materials.
o. The Substitution request shall be signed by the Contractor and the subcontractor.

The Owner and the NE shall be the judge of the equality and acceptability of the proposed substitution. If the Owner or the A/E, determines the proposed substitute product is not "equal" to the specified product, the Contractor must provide the specified product, subject to Architect's/ Engineer's shop drawing review and acceptance.

No further requests for substitutions will be considered after Preconstruction Conference.

C. Contractor's Representation: A request for a substitution constitutes a representation that Contractor:

1) Has investigated the proposed product and determined that it is equal to or superior in all respects to that specified.
2) Will provide the same warranties or bonds for the substitution as for the product specified.
3) Will coordinate the installation of an accepted substitution into the work, and make such other changes as may be required to make the work complete in all respects.
4) Waives all claims for additional costs, under his responsibility, which may subsequently

D. The Owner's and the A/E's Review: Owner and the A/E will review requests for substitutions with reasonable promptness and notify Contractor, in writing, of the decision to accept or reject the requested substitution.

E. Comparable Product Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1) Owner's Action: If necessary, the Owner or the A/E may request additional information or documentation for evaluation within ten days of receipt of a comparable product request. The A/E will notify Contractor of approval or rejection of proposed comparable product request within fifteen (15) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.

a. Form of Acceptance: As specified in Division 1 Section "Submittal Procedures."
b. Use product specified if the Owner or A/E does not make a decision on use of a comparable product request within time allocated.

F. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.

1.6 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.7 MANUFACTURER'S INSTRUCTIONS:

A. Printed Instructions: When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, Contractor shall obtain and distribute copies of such instructions to parties involved in the installation, including copies to the Architect. Maintain one set of complete instructions at the job site during installation and until completion and acceptance.

B. Strict Compliance: Handle, install, connect, clean, condition, and adjust products in strict accord with such instructions and in conformity with specified requirements. Should job conditions or specified requirements conflict with manufacturer's instruction, consult with Architect for further instructions. Do not proceed with work without clear instructions.

C. Complete Compliance: Perform work in accord with manufacturer's instructions. Do no omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.8 TRANSPORTATION AND HANDLING:

A. Deliver and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Deliveries: Contractor shall arrange deliveries of products in accord with construction schedules; coordinate to avoid conflict with work and conditions at the site. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible, and complete with instructions for handling, storing, unpacking, protecting, and installing. Immediately on delivery, inspect shipments to assure compliance with requirements of contract documents and approved submittals, and that products are properly protected and undamaged.

1) Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2) Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

C. Handling: Provide equipment and personnel to handle products by methods to prevent soiling or damage of products or packaging.

1.9 STORAGE AND PROTECTION:

A. Store products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Storage: Store products in accord with manufacturer's instructions, with seals and labels intact and legible. Store products subject to damage by the elements in weather tight enclosures. Maintain temperature and humidity within the ranges required by manufacturer's instructions. Comply with product manufacturer's written instructions for ventilation and weather-protection requirements for storage.

C. Exterior Storage: Store fabricated products above the ground, on blocking or skids; prevent soiling or staining. Cover products, which are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.

   Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.

D. Storage Inspection: Arrange storage in a manner to provide easy access for inspection and measurement of quantity or counting of units. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.

E. Protection After Installations: Provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove when no longer needed.

F. Store products in a manner that will not endanger Project structure.

G. Store cementitious products and materials on elevated platforms.

H. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

I. Protect stored products from damage and liquids from freezing.

1.10 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

   1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
   2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will coordinate selection with Owner.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.

    a. Where Work is to match existing products or installations, Architect has endeavored to identify requirements in other Sections of the Specifications or on the Drawings. Contractor shall identify and highlight any deviation or modifications from named products or manufacturers in Completed Product List.

2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.

4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
5. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
6. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
7. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
8. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's or Owner’s sample. Architect's and the Owner’s decision will be final on whether a proposed product matches.

    a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.

10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, and textures" or a similar phrase, select a product that complies with other specified requirements.

    a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
    b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect and Owner will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

11. Airport lighting equipment covered by FAA specifications require certification under the Airport Lighting Equipment Certification Program described in Advisory Circular 150/5345-53D, latest edition. Select equipment from the Certified Airport Lighting Equipment list appended to the Advisory Circular. An updated list is published biannually.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: The Owner or the Owner's designated representative will consider requests for substitution if received within 30 days after the Notice to Proceed with Construction. Requests received after that time may be considered or rejected at discretion of the Owner or the Owner's designated representative .

B. Conditions: The Owner or the Owner's designated representative will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, the Owner or the Owner's designated representative will return requests without action, except to record noncompliance with these requirements:

1. Requested substitution offers the Owner with a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities that the Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
2. Requested substitution does not require extensive revisions to the Contract Documents.
3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of Authorities Having Jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.
10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

2.3 COMPARABLE PRODUCTS

A. Conditions: The A/E and the Owner will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, the A/E and the Owner will return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.

4. List of similar installations for completed projects with project names and addresses and names and addresses of Architects and Owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01600

SUBSTITUTION REQUEST FORM

Substitution Request Number: _____ Date: / /

General Contractor: _____

Project Name: _____

Project Location: _____

A/E's Project No.: _____

Specification Section: _____

Paragraph Number: _____

Original Product Specified: _____

Proposed Product Substitution: _____

General reason for not giving priority to Specified Items: _____

Answer the following questions:	***Circle One***	
• Are extensive revisions to contract documents required?	Yes	No
• Proposed changes are in keeping with general intent of Contract Documents?	Yes	No
• Substitution affects other materials or systems? (If yes, attach complete data)	Yes	No
• Substitution requires dimensional revision or redesign of structure or MEP work? (If yes, attach complete data)	Yes	No
• Comparison of two products is attached to demonstrate equality of products? (Original specified item versus proposed substitution)	Yes	No
• The following data is furnished herewith for evaluation of the substitution: ❑ Catalog Data Sheets ❑ Drawings ❑ Reports ❑ Samples ❑ Test Data ❑ Other _____		
• Are there any schedule impacts if the original product specified is used? (If yes, please indicate the number of calendar days: _____)	Yes	No
• Scheduled delivery date of original product: ____/____/_____.		
• Scheduled delivery date of proposed substitution: ____/____/_____. Days saved ____)		
• Is the original product acceptable to local building officials? (If no, please fill in data below) Contact at Building Department: _____ Phone: ( ) - Ext. Fax: ( ) - -	Yes	No
• Are there any savings that will accrue to the Owner for use of the proposed substitution? (If yes, please indicate amount: $_____)	Yes	No
• Are there any life cycle costs savings that will accrue to the Owner for use of the proposed substitution? (If yes, please indicate amount: $_____)	Yes	No
• Are there any additional costs that will be incurred by the Owner? (If yes, identify cost impact: $_____)	Yes	No
• Are there any additional costs that will be incurred by other trade contractors? (If yes, identify total cost impact: $_____)	Yes	No
• Is the specified product or material compatible with other products or materials scheduled or specified to be installed?	Yes	No
• Is the proposed substitution compatible with other materials scheduled or specified to be installed?	Yes	No

- Can the specified product or material be installed and coordinated with the installation of other products or materials specified to be installed? Yes No
- What is the warranty period for the originally specified product? Labor ____(Yrs) Material ____(Yrs)
- What is the warranty period for the proposed substitution? Labor ____(Yrs) Years ____(Yrs)

By signature below the Contractor and/or Subcontractor proposing the material or product substitution hereby certify that the above noted information is true and accurate. The Contractor and/or subcontractor further certify that each of them waiver their rights to additional payment or time, that may subsequently become necessary because of failure of the substitution to perform adequately. **THE CONTRACTOR AND SUB-CONTRACTOR HEREBY FURTHER CERTIFY THAT THIS SUBMISSION HAS BEEN FULLY CHECKED AND COORDINATED WITH THE CONTRACT DOCUMENTS.**

_____ ____/____/____

(Subcontractor's Signature) (Date)

_____

(Printed Subcontractors Name)

_____ ____/____/____

(Contractor's Signature) (Date)

_____

(Printed Contractor's Name)

ARCHITECT OR ENGINEER OF RECORD'S ACTION AND/OR REVIEW COMMENTS:

The proposed Substitution Request has been reviewed for compliance with the Design Intent of the Contract Documents by the A/E, in accordance with the General and Supplementary Conditions of the Contract; However, this review shall not relieve the Contractor or the sub-contractor of their duties and responsibilities under the terms of the Contract, and/or the coordination and product incorporation provisions certified by the Contractor and sub-contractor above. The proposed Substitution shall **not** be incorporated into the project unless the marked accepted and Architect's acceptance is acknowledged by the Owner. The A/E's Review Comments and Response are as follows:

- ❑ Rejected; not accepted
- ❑ Revise and resubmit
- ❑ Accepted
- ❑ Accepted as noted below
- ❑ Additional Review Comments Attached
- ❑ _____

_____

_____

_____ ____/____/____

(Architect's/Engineer's Signature) (Date)

_____

(Printed Architect/Engineer's Name)

ACKNOWLEDGEMENT OF SUBSTITUTION REQUEST BY OWNER:

_____ ____/____/____

(Signature) (Date)

_____

(Printed Owner's Name)

END OF FORM

Substitution Request Number: _____ Date: / /

Project Name: _____

Architect's Project No.: _____

Proposed Product Substitution: _____

ARCHITECT OR ENGINEER OF RECORD'S ADDITIONAL REVIEW COMMENTS:

END OF ADDITIONAL REVIEW COMMENTS

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SECTION 01631 – PLANS AND SPECIFICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

1.2 GENERAL

A. The Contract Documents, Drawings and Specifications referred to in the Bid Documents shall bear the general title of the project in a title block entitled DEFUNIAK SPRINGS AIRPORT – GENERAL AVIATION CENTER.

B. The title block of the Permit Documents prepared by the Architect or Engineer of Record (A/E) shall indicate the project name, date, job number, registration number of the Architect or Engineer of Record, sheet number and the name and address of the A/E.

1.3 COPIES FURNISHED TO THE CONTRACTOR

A. After the Notice to Proceed has been issued, the Contractor will be furnished one digital (pdf) set of the Conformed Documents and a license to reproduce the Permit Documents and Contract Documents, including the Drawings and Specifications as necessary to complete the work of this project. The cost of all reproduction under this license shall be paid for by the Contractor.

B. The Contractor shall furnish each of the subcontractors, manufacturers, and materials suppliers such copies of the Final Conformed and Permit Documents as may be required for the work.

1.4 SUPPLEMENTARY DRAWINGS

A. When, in the opinion of the Owner or the A/E, it becomes necessary to explain more fully the work to be done or to illustrate the work further, or to show any changes, which may be required, drawings shown as Supplementary Drawings, with specifications pertaining thereto, will be prepared and the prints thereof will be given to the Contractor.

B. The Supplementary Drawings shall be binding upon the Contractor with the same force as the plans. Where such Supplementary Drawings require either more or less than the estimated quantities of work, credit to the Owner or compensation therefore to the Contractor shall be subject to the terms of the agreement and the appropriate change order, for the values involved, executed.

C. The Contractor shall verify all dimensions and quantities, and details shown on the plans. Supplementary Drawings, Schedules, or other data supplied to the Contractor through the office of the A/E shall notify the A/E of all errors, omissions, conflicts, and

discrepancies found therein. Failure to discover or correct errors, conflicts, or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory work, faulty construction, or improper operation resulting there from nor from rectifying such conditions at the Contractors own expense. The Contractor will not be allowed to take advantage of any error or omission, as full instructions will be furnished by the Architect, should such error or omission be discovered. All schedules are given for the convenience of the Architect and Contractor and are not guaranteed to be complete. The Contractor shall assume responsibility for the making of estimates of the size, kind, and quantity of materials and equipment included in work to be done under the contract.

1.5 CONTRACT DOCUMENTS

A. Should the Drawings disagree in themselves or with the Specifications, the Contractor shall provide the better quality or greater quantity of work or materials unless further review of evidence by the RPR or Owner clarifies the intent.

B. Any conflicts between drawings or specifications and codes shall be brought to the attention of the A/E in writing before installation. Specific code and paragraph shall be cited and in the case of local codes, the appropriate excerpt of code shall be included. No extra compensation will be allowed for code compliance. Where drawings and specifications indicate more stringent requirements or higher quality than code requires, the Drawings and Specifications shall prevail.

C. The A/E shall affirm that to the best of the A/E's knowledge at the time of final design, the applicable codes and ordinances constitute all legally adopted requirements governing the work described by these Final design and Permit Documents (plans and specifications).

1) That to the best of the A/E's knowledge the work described within the Final design and Permit Documents has been designed in full compliance with applicable codes and ordinances and with interpretations historically rendered by the governing agency indicated.
2) That it is the responsibility of said governing authority to fully review these Drawings and Specifications for code compliance prior to permitting construction of this Work in accordance with state statutes.
3) The A/E do not accept any responsibility or liability for changes in the Work required for compliance with codes and/or ordinances as a result of changes in interpretation rendered by said governing authority, either of which occurring after issuance of permit for construction of this work.

PART 2 – PRODUCTS (Refer to PART 1 above)

PART 3 – EXECUTION (Refer to PART 1 above.)

END OF SECTION 01631

SECTION 01700 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:

1) General Provision Section 50, “Control of Work”
2) General Provision Section 70, “Legal Regulations and Responsibility to Public”
3) General Provision Section 80, “Execution and Progress”
4) Section 01100, “Summary”
5) Section 01330, “Submittals”
6) Section 01710, “Cleaning and Disposal”
7) Section 01770, “Closeout Procedures”
8) Section 01781, “Project Record Documents”

C. If there is a discrepancy between the requirements of this section and related sections, the more restrictive interpretation shall apply.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1) Construction layout.
2) Installation of the Work.
3) Coordination of Owner-installed products.
4) Progress cleaning.
5) Starting and adjusting.
6) Protection of installed construction.
7) Correction of the Work.

1.3 INFORMATIONAL SUBMITTALS

A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of utility systems and other construction affecting the Work.

1) Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1) Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2) Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1) Description of the Work.
2) List of detrimental conditions, including substrates.
3) List of unacceptable installation tolerances.
4) Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to A/E according to requirements in Division 1 Section "Project Management and Coordination."

E. Surface and Substrate Preparation: Comply with manufacturer's written recommendations for preparation of substrates to receive subsequent work.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to existing benchmarks. If discrepancies are discovered, notify A/E promptly.

1) Establish benchmarks and control points to set lines and levels as needed to locate each element of Project.
2) Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
3) Inform installers of lines and levels to which they must comply.
4) Check the location, level and plumb, of every major element as the Work progresses.
5) Notify RPR when deviations from required lines and levels exceed allowable tolerances.

B. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Make the log available for reference by the RPR, A/E and the Owner.

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1) Make vertical work plumb and make horizontal work level.
2) Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3) Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4) Maintain minimum headroom clearance of 96 inches in occupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produces harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1) Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by A/E.
2) Allow for building movement, including thermal expansion and contraction.
3) Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1) Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2) Pre-installation Conferences: Include Owner's construction personnel at pre-installation conferences covering portions of the Work that are to receive Owner's work. Attend pre-installation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas as required, including public and occupied site areas adjacent to the Contractor’s work area. Enforce requirements strictly. Dispose of materials lawfully.

1) Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2) Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3) Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

4) Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1) Remove liquid spills promptly.
2) Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 1 Section "Temporary Facilities and Controls."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in Division 1 Section "General Commissioning Requirements."

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Manufacturer's Field Service: Comply with qualification requirements in Division 1 Section "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.9 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

1) Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01700

SECTION 01710 - CLEANING AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1) Cleaning during progress of the Work and at completion of the Work.
2) Disposal operations.

B. Related Requirements including the following:

1) Section 01770 Closeout Procedures for final cleaning.

1.3 DISPOSAL REQUIREMENTS:

A. Conduct cleaning and disposal operations to comply with all local, state and federal codes, ordinances, regulations, and anti-pollution laws; and with airport and construction safety requirements.

B. All disposals of waste materials shall be off airport property at locations approved by the Architect or Engineer and the Owner.

C. Contractor shall be responsible for arranging for and obtaining off-site disposal areas, including payment for all costs associated with such disposal.

1.4 SUBMITTALS:

A. Prior to beginning work, submit a Disposal Plan for the satisfactory disposal of all waste materials and debris.

B. Submit two (2) copies of the disposal site Owner’s written permission for such disposal with Disposal Plan.

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.

B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.

C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.1 CLEANING: Execute periodic cleaning to keep the work, site and adjacent properties free from accumulations of waste materials, rubbish, windblown debris, and dust resulting from construction operations. Provide on-site containers for the collection of waste materials, debris and rubbish. Remove waste materials, debris and rubbish from the site periodically and dispose of at approved locations.

3.2 BARRIERS AND PROTECTION: Protect existing structures and vegetation from cleaning and disposal operations as required.

3.3 DUST CONTROL: Schedule cleaning and other operations so that dust and other contaminants resulting there from will not fall on wet or newly coated surfaces, will not damage or contaminate aircraft, and will not unduly affect the work of other airport tenants.

3.4 DISPOSAL OF DEBRIS AND WASTE MATERIALS:

A. Contractor may not dispose of combustible materials on-site by burning.

3.5 PAYMENT**:** No separate payment will be made under this section for work described or specified herein.

END OF SECTION 01710

SECTION 01740 - WARRANTIES AND BONDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 GENERAL REQUIREMENTS:

A. Contractor shall:

1) Compile specified warranties and bonds.
2) Compile specified service and maintenance contracts.
3) Co-execute submittals to verify compliance with Contract Documents.
4) Review submittals to verify compliance with Contract Documents.
5) Submit to Engineer for review and transmittal to Owner.

B. Related requirements in other parts of the Project Manual:

1) Bid Bonds: Instructions to bidders.
2) Performance Bond and Payment Bond: Conditions of the contract.
3) General warranty of construction: Conditions of the contract.

C. Related requirements specified in other sections:

1) Warranties and Bonds required for specific products: Each respective section of specifications.
2) Provisions and duration of Warranties and Bonds: The respective section of specifications, which specifies the product.
3) Contract closeout: Section 01700
4) Operation and Maintenance Manuals: Section 01782

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SUBMITTAL REQUIREMENTS:

A. Assemble warranties, bonds, and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.

B. Number of original signed copies required: Two (2) each.

C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.

1) Product or work item.
2) Firm, with name of principal, address and telephone number.
3) Scope.
4) Date of beginning of warranty, bond, or service and maintenance contract.
5) Duration of warranty, bond, or service and maintenance contract.
6) Provide information for Owner's personnel:

    a. Proper procedure in case of failure.
    b. Instances, which might affect the validity of warranty or bond.

7) Contractor, name of responsible principal, address and telephone number.

3.2 FORM OF SUBMITTALS:

A. Prepare in duplicate packets.

B. Format:

1) Size 8 1/2 inches x 11 inches. Punch sheets for 3-ring binder. Fold larger sheets to fit into binders.
2) Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS". List:

    a. Project title and number.
    b. Owner's name.
    c. Contractor's name and address.

C. Binders: Commercial quality, 3-ring, with durable and cleanable plastic covers.

3.3 TIME OF SUBMITTALS:

A. Submit within ten (10) days after date of substantial completion, and prior to final request for payment.

B. For items of work where acceptance is delayed materially beyond the date of substantial completion, provide updated submittal within ten (10) days after acceptance, listing the date of acceptance as the start of the warranty period.

3.4 SUBMITTALS REQUIRED: Submit warranties, bonds, and service and maintenance contracts as specified in the respective sections of specifications.

3.5 PAYMENT: No separate payment will be made under this section for work described or specified herein.

END OF SECTION 01740

SECTION 01770 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:

1) General Provision Section 30, “Award and Execution of Contract”
2) General Provision Section 40, “Scope of Work”
3) General Provision Section 50, “Control of Work”
4) General Provision Section 80, “Execution and Progress”
5) General Provision Section 90, “Measurement and Payment”
6) Section 01290, “Payment Procedures”
7) Section 01322, “Photographic Documentation”
8) Section 01700, “Execution Requirements”
9) Section 01781, “Project Record Documents”
10) Section 01782, “Operation and Maintenance Data”
11) Section 01820, “Demonstration and Training”
12) Divisions 2 through 16, FAA and FDOT Sections for specific closeout and special cleaning requirements for the Work in those Sections.

C. If there is a discrepancy between the requirements of this section and related sections, the more restrictive interpretation shall apply

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1) Inspection procedures.
2) Warranties.
3) Final cleaning.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1) Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2) Advise Owner of pending insurance changeover requirements.

3) Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4) Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5) Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
6) Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
7) Complete startup testing of systems.
8) Submit test/adjust/balance records.
9) Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
10) Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
11) Complete final cleaning requirements, including touchup painting.
12) Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, A/E and the Owner will either proceed with inspection or notify Contractor of unfulfilled requirements. A/E and the Owner will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by A/E and the Owner, that must be completed or corrected before certificate will be issued.

1) Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
2) Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1) Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2) Submit certified copy of A/E's and the Owner’s Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by A/E. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3) Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4) Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videotapes.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, A/E and the Owner will either proceed with inspection or notify Contractor of unfulfilled requirements. A/E will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1) Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three (3) copies of Contractor's list and one excel file. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1) Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2) Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3) Include the following information at the top of each page:

a. Project name.
b. Project identifying numbers.
c. Date.
d. Name of Architect/Engineer.
e. Name of Contractor.
f. Page number.

1.6 WARRANTIES

A. Submittal Time: Submit written warranties on request of A/E and Owner for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1) Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2) Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.

3) Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1) Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Remove tools, construction equipment, machinery, and surplus material from Project site.
d. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
e. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
f. Sweep concrete floors broom clean in unoccupied spaces.
g. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.

h. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
i. Remove labels that are not permanent.
j. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

k. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
l. Replace parts subject to unusual operating conditions.
m. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
n. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
o. Leave Project clean and ready for occupancy.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01770

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SECTION 01781 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1) Record Drawings.
2) Record Product Data.

1.3 SUBMITTALS

A. Record Drawings: Comply with the following:

1) Number of Copies: Submit one set of marked-up Record Prints.

B. Record Product Data: Submit one copy of each Product Data submittal.

1) Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in the manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of black-line white prints of the Contract Drawings and Shop Drawings.

1) Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an understandable drawing technique.
c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2) Content: Types of items requiring marking include, but are not limited to, the following:

   a. Dimensional changes to Drawings.
   b. Revisions to details shown on Drawings.
   c. Depths of foundations below first floor.
   d. Locations and depths of underground utilities.
   e. Revisions to routing of piping and conduits.
   f. Revisions to electrical circuitry.
   g. Actual equipment locations.
   h. Duct size and routing.
   i. Locations of concealed internal utilities.
   j. Changes made by Change Order or Construction Change Directive.
   k. Changes made following Architect's and or Owner’s written orders.
   l. Details not on the original Contract Drawings.
   m. Field records for variable and concealed conditions.
   n. Record information on the Work that is shown only schematically.

3) Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
4) Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
5) Mark important additional information that was either shown schematically or omitted from original Drawings.
6) Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1) Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets. Scan and provide searchable pdf copies of all Record Drawings on a CD (or a thumb drive) along with one paper copy of the Project Record Drawings, include a table of contents and description of contents within the CD (or a thumb drive) or CD’s (or thumb drives) date and label CD’s 1 of 5, 2 of 5, 3 of 5, etc.
2) Identification: As follows:

   a. Project name.
   b. Date.
   c. Designation "PROJECT RECORD DRAWINGS."
   d. Name of Contractor.

3) Furnish one Record set of all shop drawings and approved sample for the Owner’s use. Box all shop drawings and file by specification division and include the shop drawing log. Label boxes with 1 of 5, 2 of 5, 3 of 5, etc., date and name of project.

2.2 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1) Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2) Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3) Note related Change Orders, Record Drawings, and Product Data where applicable.

2.3 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's or the Owner’s or Owner’s designated representative’s reference during normal working hours.

END OF SECTION 01781

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SECTION 01782 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Provisions and other Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:

1) General Provision Section 40, “Scope of Work”
2) General Provision Section 50, “Control of Work”
3) General Provision Section 80, “Execution and Progress”
4) General Provision Section 90, “Measurement and Payment”
5) Section 01740, “Warranties and Bonds”
6) Section 01770, “Closeout Procedures”
7) Section 01781, “Project Record Documents”
8) Divisions 2 through 16, FAA and FDOT Sections for specific operation and maintenance manual requirements for products

C. If there is a discrepancy between the requirements of this section and related sections, the more restrictive interpretation shall apply.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1) Operation and maintenance documentation directory.
2) Emergency manuals.
3) Operation manuals for systems, subsystems, and equipment.
4) Maintenance manuals for the care and maintenance of materials, systems and equipment.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

A. Initial Submittal: Submit two (2) draft copies of each manual at least fifteen (15) days before requesting inspection for Substantial Completion. Include a complete operation and

maintenance directory. Architect and Owner will return one (1) copy of draft and mark whether general scope and content of manual are acceptable.

B. Final Submittal: Submit one (1) copy of each manual in final form at least fifteen (15) days before final inspection. Architect and Owner will return copy with comments within fifteen (15) days after final inspection.

1) Correct or modify each manual to comply with Architect's and Owner's comments. Submit **three (3)** copies of each corrected manual within fifteen (15) days of receipt of Architect's and Owner's comments.
2) Provide searchable CD (or thumb drive) with all operation and maintenance data, in addition to the paper copy, date and label CD's (or thumb drives) 1 of 5, 2 of 5, 3 of 5, etc., if multiple CDs are needed. Provide a table of contents with description of the documents on the CD (or thumb drive).

1.5 COORDINATION

A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:

1) List of documents.
2) List of systems.
3) List of equipment.
4) Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with the same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1) Title page.
2) Table of contents.
3) Manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:

1) Subject matter included in manual.
2) Name and address of Project.
3) Name and address of Owner.
4) Date of submittal.
5) Name, address, and telephone number of Contractor.
6) Name and address of Architect.
7) Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1) If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

1) Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2) Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3) Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
4) Supplementary Text: Prepared on 8-1/2-by-11-inch, 20-lb/sq. ft. white bond paper.
5) Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

    1) Type of emergency.
    2) Emergency instructions.
    3) Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

    1) Fire.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

    1) Instructions on stopping.
    2) Shutdown instructions for each type of emergency.
    3) Operating instructions for conditions outside normal operating limits.
    4) Required sequences for electric or electronic systems.
    5) Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

    1) System, subsystem, and equipment descriptions.
    2) Operating standards.
    3) Operating procedures.
    4) Operating logs.
    5) Wiring diagrams.
    6) Control diagrams.

7) Piped system diagrams.
8) Precautions against improper use.
9) License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1) Product name and model number.
2) Manufacturer's name.
3) Equipment identification with serial number of each component.
4) Equipment function.
5) Operating characteristics.
6) Limiting conditions.
7) Performance curves.
8) Engineering data and tests.
9) Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1) Startup procedures.
2) Equipment or system break-in procedures.
3) Routine and normal operating instructions.
4) Regulation and control procedures.
5) Instructions on stopping.
6) Normal shutdown instructions.
7) Seasonal and weekend operating instructions.
8) Required sequences for electric or electronic systems.
9) Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1) Product name and model number.
2) Manufacturer's name.
3) Color, pattern, and texture.

4) Material and chemical composition.
5) Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1) Inspection procedures.
2) Types of cleaning agents to be used and methods of cleaning.
3) List of cleaning agents and methods of cleaning detrimental to product.
4) Schedule for routine cleaning and maintenance.
5) Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1) Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in the manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1) Standard printed maintenance instructions and bulletins.
2) Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3) Identification and nomenclature of parts and components.
4) List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1) Test and inspection instructions.
2) Troubleshooting guide.
3) Precautions against improper maintenance.

4) Disassembly; component removal, repair, and replacement; and reassembly instructions.
5) Aligning, adjusting, and checking instructions.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1) Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2) Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1) Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1) Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2) Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1) Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.

1) Do not use original Project Record Documents as part of operation and maintenance manuals.

F. Comply with Division 1 Section "Closeout Procedures" for the schedule for submitting operation and maintenance documentation.

END OF SECTION 01782

SECTION 01820 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1) Demonstration of operation of systems, subsystems, and equipment.
2) Training in operation and maintenance of systems, subsystems, and equipment.
3) Demonstration and training videos. (narrated)

1.3 SUBMITTALS

A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include three (3) learning objectives and outline for each training module.

1) At completion of training, submit three (3) complete training manuals for Owner's use.

B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

E. Demonstration and Training Videos: Submit two copies within fifteen (15) days of end of each training module.

1) Identification: On each copy, provide an applied label with the following information:

a. Name of Project.
b. Project identifying numbers.
c. Name and address of video producer.
d. Name of Architect.

e. Name of Contractor.
f. Date videotape was recorded.

1.4 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 1 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

1.5 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by the Architect and the Owner.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:

1) HVAC System and Security Controls

B. Training Modules: Develop a learning objective and teaching outline for each module. For each module, include instruction for the following:

1) Basis of System Design, Operational Requirements, and Criteria: Include the following:

a. System, subsystem, and equipment descriptions
b. Operating standards
c. Regulatory requirements
d. Equipment function
e. Operating characteristics

f. Limiting conditions
g. Performance curves

2) Documentation: Review the following items in detail:

a. Emergency manuals.
b. Operations manuals.
c. Maintenance manuals.
d. Identification systems.
e. Warranties and bonds.
f. Maintenance service agreements and similar continuing commitments.

3) Emergencies: Include the following, as applicable:

a. Instructions on meaning of warnings, trouble indications, and error messages.
b. Instructions on stopping.
c. Shutdown instructions for each type of emergency.
d. Operating instructions for conditions outside of normal operating limits.
e. Sequences for electric or electronic systems.
f. Special operating instructions and procedures.

4) Operations: Include the following, as applicable:

a. Startup procedures.
b. Equipment or system break-in procedures.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5) Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6) Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7) Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8) Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1) Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1) Schedule training with Owner, through RPR OR A/E, with at least 21 days' advance notice.

D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a written or demonstration performance-based test.

E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION AND TRAINING VIDEOS

A. General: Engage a qualified commercial videographer to record demonstration and training videos. If available, manufacturer's standard training video is acceptable where systems are substantially similar to those installed. Where pre-recorded video is not readily available, site-specific training shall be video recorded and given to Owner for use in their ongoing training program.

B. Site-specific training: Record each training module separately. As appropriate, include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1) At beginning of each training module, record each chart containing learning objective and lesson outline.

C. Video Format: Provide high-quality auto-play DVD in industry-standard format, for replay on either personal computer or DVD player to television display.

D. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training.

E. Narration: Describe scenes on video by dubbing audio narration off-site after recording. Include description of items being viewed.

END OF SECTION 01820

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SECTION 02361 – TERMITE CONTROL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Furnish and apply soil treatment with termiticide as indicated on the Drawings and specified herein.

B. Provide soil treatment at all new slab-on-grade areas within the interior of building.

1.3 QUALIFICATIONS

A. This Contractor shall be a licensed termite control operator and shall have as part of his organization a professional entomologist.

1.4 DELIVERY

A. Chemicals shall be delivered to the Project site in a transport equipped with a gauge capable of indicating the correct number of gallons being applied to required areas.

1.5 SUBMITTALS

A. Submittals shall comply with Section 01330 – Submittal Procedures.

B. Submit certifications for applicator qualifications and gauge readings of applications.

C. Submit product data including the following:

1. Working solution to be used and manufacturer's printed data.
2. The color of dye to be used.
3. Working solution to be mixed in accordance with Bureau of Entomology, State of Florida Board of Health and EPA.

D. Submit sample form of warranty per Article 1.6 of this Section.

E. Furnish an applicator’s “Certificate of Protective Treatment for Prevention of Termites” upon completion of all required FBC treatments and prior to slab-on-grade placement and provide a second copy with the project closeout documents.

1.6 WARRANTY

A. Upon completion of the work, and as a condition of Final Acceptance, Owner shall be furnished with a written warranty stipulating that termiticide treatment shall prevent subterranean termites from attacking and damaging the building or its contents for a period of not less than 5 years, starting from date of Substantial Completion of the building.

B. If subterranean termite activity exists in or under the building during the warranty period, the Contractor promptly, and without expense to the Owner, shall:

1. Retreat the soil to prevent subterranean termites from attacking the building or its contents, using means acceptable to the Owner.
2. Make good all damage caused by subterranean termite activity, up to Ten Thousand Dollars ($10,000.00).
3. The warranty shall be written in favor of the Owner. A specimen of the form of warranty shall be submitted to the Architect for review prior to commencement of work.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Working solutions shall be based on any of the following termiticides in the strength indicated and meeting approval of all Federal, State and Local Regulatory agencies:

1. “Altriset”; Syngenta.

B. Dye, of any type, such as Blazon by Milliken Chemicals, not chemically harmful to termiticide emulsions and red or blue in color shall be added to solution before application.

C. Solution shall be mixed in strict accordance with spray solution chart as prepared by the Bureau of Entomology, State of Florida Board of Health and EPA.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

A. Termiticides shall be applied by experienced skilled mechanics and in the best workmanlike manner of this trade.

B. Termite control shall not begin until all the subgrade soil preparation work has been completed and made ready for the vapor barrier installation.

C. Termiticides shall not be applied when soil is excessively wet as determined by the Owner’s Testing Laboratory.

3.2 APPLICATION

A. Application for emulsion shall be applied as follows, but in NO CASE less than the manufacturer's printed directions for use for preconstruction treatment.

B. Horizontal Barriers: Termiticides shall be applied uniformly to all areas that will be covered by concrete slabs, including beneath sidewalks and entrance platforms adjacent to the building.

1. To produce a horizontal barrier, apply the emulsion at the rate of 1 gallon per 10 square feet of backfill.
2. If the backfill is washed gravel or other course material, apply at 1-1/2 gallons per 10 square feet.
3. At critical areas such as along the inside of foundation walls, around plumbing, utility services, and other features that will penetrate the concrete slab(s), apply emulsion at 2 gallons of solution per 5 linear feet to soil.
4. Applications shall be made with pressures less than 50 psi at the nozzle, using a course spray nozzle.
5. If concrete slabs cannot be poured over soil the same day it has been treated, a waterproof cover shall be placed over the soil to prevent erosion.

C. Vertical Barriers: Vertical barriers shall be established in soil which will be under the perimeters of floating or supported slabs, around utilities and in other critical areas which will be covered by concrete. After the final exterior grading is completed, vertical barriers shall be created in backfilled soil against foundation walls or against the outside of monolithic slab.

1. To produce a vertical barrier, apply the emulsion at the rate of 4 gallons per 10 linear feet of depth from grade to the top of the footing.
2. In hollow concrete masonry unit voids, apply emulsion at the rate of 2 gallons per 10 linear feet.

D. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities.

END OF SECTION 02361

APPENDIX A

APPENDIX “B”

OWNER FURNISHED FURNITURE, FIXTURES AND EQUIPMENT (FF&E)

All other equipment shown or schedule in the Contract Documents shall be furnished and installed by the GC unless noted below:

OWNER FURNISHED FF&E ITEMS

1. Office Furniture [Desks (Non millwork or cabinetry), Free Standing Credenzas, Chairs, File Cabinets, Shelving Units (Non Millwork or cabinetry), etc.] Shown Dashed within the Architectural Floor Plans.

2. AV equipment (projectors) Televisions Sets/Flat Screen Displays [Power, AV & TV Cable Pull/Junction Boxes and Cover Plates, Installation & Blocking, Concealed Overhead Screens, Wall Brackets (Overhead or Wall Mounted) for Mounting TV’s by GC]

3. TV Cable Wiring [Pull Boxes and Plates by GC]

4. FBO COMMUNICATION Receiver Antenna & Receiver Devices. [Pull/Junction Boxes and Cover Plates by GC]

5. Airport or Tenant Computers and Computer Screens and Keyboards

6. Security/Cameras. Card Readers, and access control devices and security system elements including wiring [Door Hardware/Electrical Locks, Pull Boxes, Chase ways coordination and interface verification for automatic doors and electrical locks and Power Supply, Pull/Junction Boxes and Cover Plates by GC]

7. Free Standing Trash Receptacles [Not Scheduled]

8. Cleaning Equipment & Mop Sink Cleaning Chemical Dispensers

9. Hand Sanitizers (Installed by GC to meet ADA requirements)

10. AED Equipment (Storage Cabinet by GC)

11. AED equipment and AED training provided by Owner.

12. Tenant Equipment and FF& E items
13. Pull Down Map
14. Graphic Images for Restroom & Lobby Glassed-Murals
15. Artwork
16. Coffee Maker

END OF APPENDIX B

APPENDIX C

SECTION 02361 – TERMITE CONTROL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Furnish and apply soil treatment with termiticide as indicated on the Drawings and specified herein.

B. Provide soil treatment at all new slab-on-grade areas within the interior of building.

1.3 QUALIFICATIONS

A. This Contractor shall be a licensed termite control operator and shall have as part of his organization a professional entomologist.

1.4 DELIVERY

A. Chemicals shall be delivered to the Project site in a transport equipped with a gauge capable of indicating the correct number of gallons being applied to required areas.

1.5 SUBMITTALS

A. Submittals shall comply with Section 01330 – Submittal Procedures.

B. Submit certifications for applicator qualifications and gauge readings of applications.

C. Submit product data including the following:

1. Working solution to be used and manufacturer's printed data.
2. The color of dye to be used.
3. Working solution to be mixed in accordance with Bureau of Entomology, State of Florida Board of Health and EPA.

D. Submit sample form of warranty per Article 1.6 of this Section.

E. Furnish an applicator’s “Certificate of Protective Treatment for Prevention of Termites” upon completion of all required FBC treatments and prior to slab-on-grade placement and provide a second copy with the project closeout documents.

1.6 WARRANTY

A. Upon completion of the work, and as a condition of Final Acceptance, Owner shall be furnished with a written warranty stipulating that termiticide treatment shall prevent subterranean termites from attacking and damaging the building or its contents for a period of not less than 5 years, starting from date of Substantial Completion of the building.

B. If subterranean termite activity exists in or under the building during the warranty period, the Contractor promptly, and without expense to the Owner, shall:

1. Retreat the soil to prevent subterranean termites from attacking the building or its contents, using means acceptable to the Owner.
2. Make good all damage caused by subterranean termite activity, up to Ten Thousand Dollars ($10,000.00).
3. The warranty shall be written in favor of the Owner. A specimen of the form of warranty shall be submitted to the Architect for review prior to commencement of work.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Working solutions shall be based on any of the following termiticides in the strength indicated and meeting approval of all Federal, State and Local Regulatory agencies:

1. “Altriset”; Syngenta.

B. Dye, of any type, such as Blazon by Milliken Chemicals, not chemically harmful to termiticide emulsions and red or blue in color shall be added to solution before application.

C. Solution shall be mixed in strict accordance with spray solution chart as prepared by the Bureau of Entomology, State of Florida Board of Health and EPA.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

A. Termiticides shall be applied by experienced skilled mechanics and in the best workmanlike manner of this trade.

B. Termite control shall not begin until all the subgrade soil preparation work has been completed and made ready for the vapor barrier installation.

C. Termiticides shall not be applied when soil is excessively wet as determined by the Owner’s Testing Laboratory.

3.2 APPLICATION

A. Application for emulsion shall be applied as follows, but in NO CASE less than the manufacturer's printed directions for use for preconstruction treatment.

B. Horizontal Barriers: Termiticides shall be applied uniformly to all areas that will be covered by concrete slabs, including beneath sidewalks and entrance platforms adjacent to the building.

1. To produce a horizontal barrier, apply the emulsion at the rate of 1 gallon per 10 square feet of backfill.
2. If the backfill is washed gravel or other course material, apply at 1-1/2 gallons per 10 square feet.
3. At critical areas such as along the inside of foundation walls, around plumbing, utility services, and other features that will penetrate the concrete slab(s), apply emulsion at 2 gallons of solution per 5 linear feet to soil.
4. Applications shall be made with pressures less than 50 psi at the nozzle, using a course spray nozzle.
5. If concrete slabs cannot be poured over soil the same day it has been treated, a waterproof cover shall be placed over the soil to prevent erosion.

C. Vertical Barriers: Vertical barriers shall be established in soil which will be under the perimeters of floating or supported slabs, around utilities and in other critical areas which will be covered by concrete. After the final exterior grading is completed, vertical barriers shall be created in backfilled soil against foundation walls or against the outside of monolithic slab.

1. To produce a vertical barrier, apply the emulsion at the rate of 4 gallons per 10 linear feet of depth from grade to the top of the footing.
2. In hollow concrete masonry unit voids, apply emulsion at the rate of 2 gallons per 10 linear feet.

D. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities.

END OF SECTION 02361

SECTION 03360 – MECHANICALLY GROUND AND POLISHED CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to Work of this Section.

B. Section Includes:
   1. Curing of interior polished concrete slabs.
   2. Finishing of polished concrete slabs.
   3. Densified & Mechanically Polished concrete.
   4. Broad cast aggregates

C. Related Sections:
   1. Division 3 Section “Cast-In-Place Concrete” for general applications of concrete and coordination of sample submittal.
   2. Division 3 Section “Dye Stain Polished Concrete”
   3. Division 7 Section “Caulking and Sealants” for colored sealant for joints.

1.2 REFERENCES

A. American Concrete Institute (ACI):
   1. ACI 301 “Specification for Structural Concrete for Buildings.”
   2. ACI 302 IR “Recommended Practice for Concrete Floor and Slab Construction.”
   3. ACI 303.1 “Standard Specification for Cast-In-Place Architectural Concrete.”
   4. ACI 304 “Recommended Practice for Measuring, Mixing, Transporting and Placing of Concrete.”
   5. ACI 305R “Recommended Practice for Hot Weather Concreting.”
   6. ACI 306R “Recommended Practice for Cold Weather Concreting.”

B. American Society for Testing and Materials (ASTM):
   1. ASTM C309 “Liquid Membrane-Forming Compounds for Curing Concrete.”
   2. ASTM C494 “Standard Specification for Chemical Admixtures for Concrete.”
   3. ASTM C979 “Standard Specification for Pigments for Integrally Colored
      i. Concrete.”
   4. ASTM E430 “Standard Specification for Evaluating Polished Concrete Glow”

C. American Association of State Highway and Transportation Officials (AASHTO):
   1. AASHTO M194 “Chemical Admixtures.”

D. Concrete Polishing Association of America (CCPA) – Standards and Guidelines

E. National Floor Safety Institute (NFSI) – Floor Friction Standards

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's complete technical data sheets for the following:
   1. Liquid Lithium Silicate Densifier
   2. Wet Curing Blanket.
   3. Protective Blanket for finished concrete floors
   4. Sealant
   5. Sealer

B. Design Mixes: For each type of polished concrete.

C. Qualification Data: For firms indicated in "Quality Assurance" Article, including list of completed projects.

D. Submit the following in accordance with Division 1 Section 01330 "Submittal Procedures."

E. Product data for each grinding machine, including all types of grinding heads, dust extraction system, joint filler, concrete densifying impregnator, penetrating sealer, and any other chemicals used in the process.

F. Applicators qualification data.
   1. Southland Concrete Creations (941-721-4900) is pre-approved for this project.
   2. Applicators must have a minimum of (5) five years experience in this field. Applicator must show names and addresses of (3) three similar jobs.
   3. Applicators must show experience in pouring concrete, broadcasting aggregate, and polishing exposed broadcast aggregate concrete floors.
   4. Include written certification from LM Scofield showing they are qualified to perform this work.

G. Polished concrete samples: Size 24"x 24" , for each Polished Concrete finish required. Field test area of placed concrete – 10'-0" x 10'-10".

I. Product Data: Provide data on all products, including information on compatibility of different products and limitations

J. Field Quality Control – Static Coefficient of Friction Test Reports: Reports of testing specified in PART 3 "Field Quality Control" Article.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer with experience in the production of specified products.

B. Installer Qualifications: An installer with 5 years experience with work of similar scope and quality, and approved in writing by the manufacturer.

C. Comply with the requirements of ACI 301.

D. Obtain each specified material from same source and maintain high degree of consistency in workmanship throughout Project.

E. Notification of manufacturer's authorized representative shall be given at least 1-week before start of Work.

F. Pre-installation Conference: Conduct conference at project site to comply with requirements in Division 1, Section 01310 “Project Management and Coordination.”

G. Provide project names, addresses, contact names, phone numbers of at least three (3) projects of similar scope completed by the installer.

H. Installer/Applicator shall be certified by concrete finish equipment and chemical manufacturer and shall provide adequate number of skilled workmen who are thoroughly trained and experienced in the necessary craft.

I. Manufacturer’s Certification: Provide a letter of acknowledgement from both the equipment and chemical manufacturer stating that the installer is a trained applicator and is familiar with proper procedures and installation requirements recommended by the manufacturer.

J. Ground and Polished Concrete Mockups:
   1. Provide under provisions of Division 1 Section “Quality Control.”
   2. At location on Project selected by Architect, place and finish 10 ft. by 20 ft.area.
   3. Construct mockup using processes and techniques intended for use on permanent work, including curing procedures. Include samples of control, construction, and expansion joints in sample panels. Mockup shall be produced by the individual workers who will perform the work for the Project.
   4. Retain samples of cements, sands, aggregates and used in mockup for comparison with materials used in remaining work.
   5. Aggregate selected must be tested to ensure it will accept polish.
   6. Refer to subparagraph 3.5 of this Section for Scheduled polished concrete cut and shine level and finish coat.
   7. Edges should be included in mockup.
   8. Accepted mockup provides visual standard for work of Section.
   9. Mockup shall remain through completion of work for use as a quality standard for finished work. Protect mock-ups from elements with weather resistant covering and maintain approved field mock ups during construction in an undisturbed condition as a standard for judging completed work.
   10. Remove mockup when directed.
   11. Provide test area that shall be concealed from public view for confirmation of grinding operations.

K. Environmental Limitations:
   1. Comply with manufacturer’s written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation and other conditions affecting chemical performance.

2. Application of finish system shall take place a minimum of 21 days prior to fixture and trim installation and/or substantial completion.
3. Finish concrete area shall be closed to traffic during finish floor application and after application for the time as recommended by the manufacturer.

L. Walkway Auditor: Certified by NFSI to test polished floors for static coefficient of friction according to NFSI 101-A.

M. Static Coefficient of Friction: Achieve not less than 0.5 for level floor surfaces as determined by quality control testing according to NFSI 101-A.

1.5 DELIVERY, STORAGE AND HANDLING

A. Comply with manufacturer's instructions. Deliver liquid densifier in original, unopened packaging. Store in dry conditions.

1.6 PROJECT CONDITIONS

A. Polished Concrete Environmental Requirements:
1. Schedule placement to minimize exposure to wind and hot sun before curing materials are applied.
2. Avoid placing concrete if rain, snow, or frost is forecast within 24-hours. Protect fresh concrete from moisture and freezing.
3. Comply with professional practices described in ACI 305R and ACI 306R.

B. Schedule delivery of concrete to provide consistent mix times from batching until discharge. Mix times shall meet manufacturer’s written recommendations.

1.7 PRE-JOB CONFERENCE

A. Two weeks prior to placement of concrete a pre-installation meeting will be held to discuss the Project and application of materials.

B. The Architect, General Contractor, Subcontractor, Testing Agency, Ready-Mix Concrete Representative, and a Manufacturer's Representative shall be present.

C. Proposed Agenda:
1. Environmental requirements.
2. Scheduling and phasing of work.
3. Coordinating with other work and personnel.
4. Protection of adjacent surfaces.
5. Surface preparation.
6. Repair of defects and defective work prior to installation.
7. Cleaning.
8. Application of liquid hardener, densifier.
9. Importance of un-reacted silicate rinse.
10. Installation of polished non-film forming floor finishes

11. Protection of finished surfaces after installation.
12. Sustainable design issues
13. Storage and Disposal of unused materials

D. Reports: Record discussions, including decisions and agreements reached, and furnish copy of record to each party attending.

E. Damage and Stain Prevention: Take precautions to prevent damage and staining of concrete surfaces to be polished.
1. Prohibit vehicle parking over concrete surfaces to be polished.
2. Prohibit pipe cutting operations over concrete surfaces to be polished.
3. Prohibit storage of any items over concrete surfaces to be polished for not less than 28 days after concrete placement.
4. Prohibit ferrous metals storage over concrete surfaces to be polished.
5. Protect from petroleum, oil, hydraulic fluid, or other liquid dripping from equipment working over concrete surfaces to be polished.
6. Protect from acids and acidic detergents contacting concrete surfaces to be polished.
7. Protect from painting activities over concrete surfaces to be polished.

F. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting liquid applied product application.

1.8 WARRANTY

A. Provide year manufacturer's standard (10) ten year material warranty commencing at date of building substantial completion. Manufacturer shall warrant to the owner that polished surface will remain water repellent, dustproof, hardened and abrasion resistant.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

A. Basis of Design: L.M. SCOFIELD COMPANY, Douglasville, Georgia (800) 800-9900 or the appropriate local contact: Eastern Division – 201-672-9050; Florida Representative, Steve Rissi – 727-515-1849

B. Other acceptable and qualified manufactures approved by the Architect and that meet or exceed the specified requirements. Substitutions shall be submitted in accordance with Division 1, Section 01600 - Materials and Equipment.

2.2 MATERIALS & EQUIPMENT

A. Liquid Densifier: Odorless, non-hazardous, silicate that penetrates concrete to react with free lime and calcium hydroxide to produce permanent chemical reaction that hardens and densifies concrete surface.

B. Dyes: Extremely fine molecules of color solvent or dye for mixing with water or acetone that is designed to penetrate and color concrete surface. Refer to specification Section 03361 “Dye Stained Colored Polished Concrete” for additional requirements.

C. Pigmented Microstains: Extremely fine pigment particles in a water-based silicate solution that penetrates concrete and reacts with calcium hydroxide to lock in color particles.

D. Polish Guard: Non-film forming, stain resistant, food resistant, chemical stain resistant, impregnating sealant designed to be used on concrete surfaces previously densified

E. Curing Compound for Dye Stained Concrete:
   a. MC Tech UltraCure NCF (866)-913-8363

F. Chemical Hardener/Densifiers Manufactured by L.M. SCOFIELD COMPANY:
   a. SCOFIELD® Formula One™-MP is a high performing hardening and dust proofing compound that is chemically reactive and permanently bonds to concrete formulated to be used in conjunction with integrally colored concrete as well as uncolored concrete. (No substitutions – unless approved in writing by the Architect)
   b. SCOFIELD® Guard-W

G. 3-head or 4-head counter rotating variable speed floor grinding machine with at least 600 pounds down pressure.

H. Dust extraction system, pre-separator, and squeegee attachments with minimum flow rating of 322 cubic feet per minute.

I. Protective Blanket for Finished Floor: Dura Cover by Pro Guard 888-977-6482

J. Substitutions: The use of products other than those specified will be considered providing that the Contractor requests its use in writing aspect Section 1600 Materials and Equipment prior to bid date. This request shall be accompanied by the following:
   1. A certificate of compliance from material manufacturer stating that proposed products meet or exceed requirements of this Section, including standards ACI 303.1, ASTM C979, ASTM C494 and AASHTO M194.
   2. Documented proof that proposed materials have a 10-year proven record of performance, confirmed by at least 5 local projects that Architect can examine.

2.3 ACCESSORIES

A. Patching Compound: Compound composed of 40 percent portland cement, 45 percent limestone, and 15 percent vinyl acetate copolymer, when mixed with dust salvaged from grinding process forms a paste that hardens when surface imperfections are filled.

B. Grout Material: REQUIRED Clear modified silicate sealant, containing no pore clogging latex, when mixed with dust salvaged from grinding process forms a paste that reacts with calcium hydroxide in concrete that hardens when surface imperfections are filled.

C. Protective Cover: Non-woven, puncture and tear resistant, polypropylene fibers laminated with a multi-ply, textured membrane, not less than 18 mils in thickness.

2.4 POLISHING EQUIPMENT

A. Field Grinding and Polishing Equipment:
   1. Variable speed, multiple head, counter-rotating, walk-behind machine with not less than 600 pounds of down pressure on grinding or diamond polishing pads.
   2. If dry grinding, honing, or polishing, use dust extraction equipment with flow rate suitable for dust generated, with squeegee attachments.

B. Edge Grinding and Polishing Equipment: Hand-held or walk-behind machines which produces same results, without noticeable differences, as field grinding and polishing equipment.

C. Burnishing Equipment: High speed walk-behind or ride-on machines capable of generating 2400 revolutions per minute and with sufficient head pressure of not less than 20 pounds to raise floor temperature by 20 degrees F.

D. Metal Bonded Pads: Grinding pads with embedded industrial grade diamonds of varying grits fabricated for mounting on equipment.

E. Resin Bonded Pads: Polishing pads with embedded industrial grade diamonds of varying grits fabricated for mounting on equipment.

F. Burnishing Pads: Maintenance pads for use with high speed burnishing equipment.

2.5 CONCRETE MIX DESIGN

A. Refer to concrete specifications.

B. Do not add calcium chloride to mix as it causes mottling and surface discoloration.

C. Supplemental admixtures shall not be used unless approved by manufacturer. Mix design is to include high range water reducer and ¾# of Propex 150 fiber (stealth) or Architect/Engineer approved equal.

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2.6 BROAD CAST AGGREGATES

1. Blue Glass: match Architect's sample #3 sized aggregate with broadcast spread at rate of 0.50lbs/SF

2. Black Aggregate/Glass: #2 sized black aggregate or black glass with broadcast rate of 0.20lbs/SF.

3. Black Beauty Aggregate integral to the concrete mix, rate of 10% of the cement mix design, or less based on the architect approved sample.

PART 3 - EXECUTION

3.1 CONCRETE INSTALLATION

A. Install concrete according to requirements of Division 3 Section “Cast-In-Place Concrete.”

B. Do not add water to concrete mix in the field.

C. Surfaces shall be finished uniformly with the following finish:
1. Broad Cast Aggregate: TO BE PERFORMED BY POLISHING CONTRACTOR WORKING ALONG SIDE CONCRETE FINISHING CONTRACTOR. Field broadcast aggregate to top layer of concrete to achieve variegated colored finish and aggregate color aggregate should be applied at a consistent rate to provide a relative uniform appearance of the aggregate application to match mock up sample.
2. Trowel: Precautions should be taken to ensure that the surface is uniformly troweled so that it will not be slippery. Do not over-trowel or burnish the surface.
3. Finish concrete shall have a minimum Floor Flatness rating of at least 50.
4. Finish concrete shall be cured a minimum of 7 days or at which point equipment can be put on the slab and provided the initial grinding does not displace aggregate. Initial grind may be performed as soon as grinders will cut the concrete without tearing surface of concrete pending test area results. A grinding test area shall be established that is not visible to public or that will be concealed to confirm acceptability of proceeding with grinding operations. Final polish may not be performed until concrete is cured a minimum of 28 days old
5. Ground and Polished Concrete Surface: Precautions should be taken to insure the surface is within in tolerance to perform this function.

3.2 CURING

A. Concrete: Apply wet curing blanket for concrete according to manufacturer's instructions using manufacturer’s recommended application techniques. Cured Concrete floor shall be wet cleaned with an Auto Scrubber as the wet blankets are removed to remove any surface laitance.

B. Precautions shall be taken in hot weather to prevent plastic cracking resulting from excessively rapid drying at surface as described in CIP 5 *Plastic Shrinkage Cracking* published by the National Ready Mixed Concrete Association.

3.3 EXAMINATION

A. Acceptance of Surfaces and Conditions:
   1. Examine substrates to be polished for compliance with requirements and other conditions affecting performance.
   2. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents.
   3. Starting work within a particular area will be construed as acceptance of surface conditions.

3.4 PREPARATION

A. Cleaning New Concrete Surfaces:
   1. Prepare and clean concrete surfaces.
   2. Provide sound concrete surfaces free of laitance, glaze, and efflorescence, curing contaminants incompatible with liquid applied products and polishing.

3.5 MECHANICALLY POLISHED CONCRETE CUT AND SHINE LEVELS

A. Cut Level (Depth of cut)

   1. Grade 3 – heavy exposure of course aggregate; remove no more than 1/3” of concrete surface by grinding and polishing resulting in a majority of exposure displaying medium aggregate with small amount of large aggregate at random locations in accordance with Concrete Polishing Association of America standards

B. Shine Level

   1. Class 3 – 1500 grit polish high gloss
   2. Procedure: Not less than 6 steps with full refinement of each diamond pad up to 1500 grit resin bonded pad with one application of densifier.
   3. Gloss Reading: Not less than 60 according to ASTM E 430 before polish guard application.

C. Polished concrete finish coat
   1. At a distance of 100 feet, the floor will reflect images from side lighting. Sheen shall be as measured by Horiba IG-620 Gloss checker – 60 degree film gloss valve = 80 minimum or ASTM E430.
   2. Apply two applications of SCOFIELD® Finish Coat. Guard W

D. Specified for project
   Grade: 3 heavy exposure of course aggregate
   Class: 3 grit polish high gloss
   Guard-W Finish Coat applications: (2) two coats minimum.

3.6 MECHANICALLY POLISHED CONCRETE APPLICATION

A. Applicator shall examine the areas and conditions under which work of this section will be provided and the General Contractor shall correct conditions detrimental to the timely and proper completion of the work and the Applicator shall not proceed until unsatisfactory conditions are resolved.

B. Installer and manufacturer's representative will examine surfaces receiving concrete finish and polishing system.
   a. Verify that surfaces conform to product manufacturer's requirements for substrate conditions.
   b. Verify floor is free of curing membrane, bond-breaker, concrete laitance, and will absorb water per water absorbency test.

C. Sequence of Polishing: Perform initial grind before interior walls are framed and constructed. Perform final grinding and polishing after partition studs are erected, but before gypsum board is installed.

D. Treating Surface Imperfections:

1. Mix patching compound and grout material with dust created by grinding operations to match color of adjacent concrete surface.
2. Fill surface imperfections including, but not limited to, holes, surface damage, small and micro cracks, air holes, pop-outs, and voids.
3. Work compound and treatment until color differences between concrete surface and filled surface imperfections are not reasonably noticeable when viewed from (10) ten feet away under lighting conditions that will be present after construction.

E. Grout Grinding:

1. Use grinding equipment and appropriate grit grinding pads.
2. While applying fresh grout material prior to, grind concrete in direction perpendicular to initial grinding to remove scratches.
3. Vacuum floor using squeegee vacuum attachment after each pass.

F. Honing:

1. Use grinding equipment with resin bonded grinding pads.
2. Grind concrete in one direction starting with 50 grit pad and make as many sequential passes required to remove scratches, each pass perpendicular to previous pass, up to 400 grit pad reaching maximum refinement with each pass before proceeding to finer grit pads.
3. Auto scrub or vacuum floor using squeegee vacuum attachment after each pass.

G. Grind the concrete floor to within (2) two inches of walls up to 150 grit metal bond diamond pads removing construction debris, floor slab imperfections. The starting grinding pad grit will be determined by condition of concrete slab and Grade finish specified.

1. Use polishing equipment with resin bonded polishing and burnishing pads.
2. Begin polishing in one direction starting with 150 grit pad.
3. Make sequential passes with each pass perpendicular to previous pass using finer grit pad with each pass, up to 1500 grit.
4. Achieve maximum refinement with each pass before proceeding to finer grit pads.
5. Auto scrub or vacuum floor using squeegee vacuum attachment after each pass.

6. Continue polishing until gloss appearance, as measured according to ASTM E 430, matches approved field mock-ups, and reflectance meets or exceeds the provisions outlined in the specifications, or as approved by the Architect.

H. (If specified) Grind the edges up to 150 grit grinding pads removing all the scratches from the previous grit. Vacuum the floor thoroughly after each grind using a squeegee vacuum attachment.

I. Apply densifying impregnator undiluted at approximately 200-400 square feet per gallon using a stiff, long bristled broom. Cover the entire area liberally. Using a broom, work the densifier into the substrate for 30 minutes. During this 30-minute period, continually keep the substrate wet with densifier. Squeegee excess material off the floor. Remove all residue by scrubbing and flushing surface with clean water. Allow 12 to 24 hours for full cure.

J. Polish the floor, to the specified sheen level, with phenolic resin bonded diamond grits, first polishing the edges (if specified) with pads of the same grit and then the field of the floor removing all scratches from the previous grit. After each polish, clean the floor thoroughly using clean water and an auto scrubber or a mop and a wet vacuum.

K. Apply Guard-W Finish coat at 1000 square feet per gallon. Allow to dry 1-2 hours.

L. Using a high speed (2400 rpm) burnishing machine equipped with [1500] grit diamond impregnated pads, buff the surface to a high shine.

M. Apply second application of Guard-W Finish Coat at 1000 sq. per gallon. Allow to dry 1-2 hours.

N. Using a high speed (2400 rpm) burnishing machine equipped with [1500] grit diamond impregnated pads, buff the surface to a high shine.

O. Upon completion, the work shall be ready for final inspection and acceptance by the Architect.

P. Change in gloss to 80 as measured using a gloss meter in accordance with Horiba IG-320 Glass Checker or 60 ASTM E 430 before polish guard application.

3.7 JOINT FILLER

A. Prime and fill with manufacturer's approved polyurea shore 55 or 65 semi rigid joint filler epoxy joint sealant those joints that require the application of joint sealant after the application of the finishing system or as directed by the manufacturer or Architect.

3.8 TOLERANCES

A. Minor variations in appearance of polished colored concrete, which are similar to natural variations in color and appearance of unpolished concrete, are acceptable.

3.9 CLEANING

A. The work area shall be kept clean and free of debris at all times.

B. Remove slurry and dust from adjoining surfaces as necessary.

C. Dispose of material containers in accordance with local regulations and sustainable guide lines.

D. Protect finished work until fully cured per manufacturer’s recommendations.

3.10 PROTECTION

A. Protect concrete floors prior to as well as after the polishing process with ProGuard Dura Cover Protective Blankets (877-977-6482)

3.11 FIELD QUALITY CONTROL

A. Field Testing: Engage a qualified walkway auditor to perform field testing according to NFSI 101-A to determine if polished concrete floor finish complies with specified static coefficient of friction.

B. Confirming gloss level as per specified requirements.

3.12 CLOSEOUT ACTIVITIES

A. Maintenance Training: CPAA Master Craftsman shall train Owner's designated personnel in proper procedures for maintaining polished concrete floor.

END OF SECTION 03360

SECTION 03481 – PRECAST CONCRETE BOLLARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Precast concrete bollards.

B. Related Requirements:

1. 03300 Cast-In-Place Concrete.
2. 05500 Metal Fabrications.

1.3 REFERENCE STANDARDS

A. ASTM C666 – Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.

B. ASTM C825 – Standard Specifications for Precast Concrete Barriers.

C. ASTM C979 – Standard Specification for Pigments for Integrally Colored Concrete.

1.4 SUBMITTALS

A. Comply with Section 01330- Submittal Procedures.

B. Product Data: Provide for each type of bollard specified, including shop drawing showing reinforcing & bollard setting method.

C. Color & Finish Samples: Submit specified colors and finishes for selection and approval by the Architect.

D. Maintenance Data: Submit manufacturer’s field touch-up, cleaning and maintenance instructions

E. Warranty Documentation: Submit sample of manufacturer’s warranty

1.5 QUALITY ASSURANCE

A. Comply with Section 01400 – Quality Requirements and Tasting Laboratory Services.

1.6 DELIVERY, STORAGE AND HANDLING

A. Comply with Section 016600 – Materials and Equipment

B. Protect bollards and accessories during delivery, storage, and handling.

1.7 WARRANTY

A. Comply with Section 01740 – Warranties and Bonds and 01770 Closeout Procedures.

B. Provide manufacturer's standard warranty against defects in materials and workmanship.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design/Manufacturer: Precast Keystone 4610 Enterprise Ave Naples, Florida 34104, phone (239) 435-3575, website https://precastkeystone.com/, email info@precastkeystone.com

B. Substitutions Comply with provisions of Section 01600 Materials and Equipment for substitution procedures. Alternate manufacturers that meet the requirements of the Contract Documents and approval of the Architect will be considered.

2.2 PRECAST CONCRETE BOLLARDS

A. Materials:

1. Concrete: Precast concrete with 5000 psi minimum compressive strength.
   a. Components: ASTM C150, Type I or III cement, Shell Black Beauty & Lite Gray Limestone and Shell aggregate to match the concrete columns exposed aggregate.
   b. Pigments: ASTM C979, natural mineral oxide pigments, temperature-stable and non-fading.
2. Reinforcing: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed or 6x6x10 gauge wire mesh (where needed), with minimum of 1" concrete cover.
3. Steel Pipe: ASTM A 500, Grade B.
4. Cement- Very light gray color or white- 7-7½ bag per cubic yard; color to be selected by Architect.

5. Chemically entrained air (6-8%) for salt and chloride resistant.
6. Cured indoors under plastic cover before exposure to outside air.
7. Finish- Exposed aggregate – Light to medium sand blasted finish
8. Sealer – Manufacturers standard non-gloss-clear-penetrating sealer, minimum of two (2) coats.
9. Lifting ring – Integral lifting ring

B. Installation: Sleeve over galvanized metal pipe bollard.

2.3 ACCESSORIES

A. Installation Materials:

1. Grout: Non-shrink, non-ferrous grout.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine paving of other substrates for compliance with manufacturer's requirements for placement and location of embedded items, condition of substrate, and other conditions affecting installation of bollards.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's installation instructions and setting drawings.

B. Damaged, cracked, chipped, deformed or marred bollards are not acceptable. Field touch-up minor imperfections in accordance with manufacturer's instructions.

C. Precast Concrete Bollards: Install according to manufacturer's instructions:

1. Sleeved for steel substrates: Support bollard during placement and grout cure.

3.3 CLEANING & PROTECTION

A. Protect bollards against damage.

B. Immediately prior to Substantial Completion, clean bollards in accordance with manufacturer's instructions to remove dust, dirt, adhesives, and other foreign materials.

C. Touch up damaged finishes according to manufacturer's instructions.

3.4 CLOSEOUT ACTITIVIES

A. Provide executed warranty.

END OF SECTION 03481

SECTION 04412 – THIN SET STONE VENEER

PART 1 – GENERAL

A. Drawings and general provisions of the Contract, including General Provisions and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.1 SECTION INCLUDES

A. Stone cladding, siding and veneer of interior and exterior walls as indicated on the Drawings.

B. Stone accent trim and shapes.

1.2 RELATED SECTIONS

A. Section 04810 - Unit Masonry Assemblies (Concrete Unit Masonry): Masonry supporting walls.

B. Section 05500 - Metal Fabrications: Galvanized shelf angles, structural supports, anchors and other built-in components for building into natural thin veneer stone.

C. Section 07900 - Caulking and Sealants: Sealant and joint filler for perimeter and control joints.

D. Section 09180 - Cement Plaster Stucco: Metal lath and scratch coat back-up over supporting walls.

1.3 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI A118.4 – Specifications for Latex-Portland Cement Mortar.

B. American Society for Testing and Materials (ASTM):

1. ASTM C 39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
2. ASTM C 67 – Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
3. ASTM C 144 – Standard Specification for Aggregate for Masonry Mortar.
4. ASTM C 177 – Standard Test Method for Steady-State Head Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
5. ASTM C 207 – Standard Specification for Hydrated Lime for Masonry Purposes.
6. ASTM C 270 – Standard Specification for Mortar for Unit Masonry.
7. ASTM C 482 – Standard Test Method for Bond Strength of Ceramic Tile to Portland Cement.

8. ASTM C 567 – Standard Test Method for Determining Density of Structural Lightweight Concrete.
9. ASTM C 847 – Standard Specification for Metal Lath.
10. ASTM C 932 – Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering.
11. ASTM C 979 – Standard Specification for Pigments for Integrally Colored Concrete.
12. ASTM C 1032 – Standard Specification for Woven Wire Plaster Base.
13. ASTM C 1059 – Standard Specification for Latex Agents for Bonding Fresh To Hardened Concrete.
14. ASTM D 226 – Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
15. ASTM C1063 – Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster
16. ASTM C1329 – Standard specification for Portland cement
17. ASTM C578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
18. ASTM C1289 – Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
19. ASTM E2556/E2556M – Standard Specification for Vapor Permeable Flexible Sheet Water-Resistive Barriers Intended for Mechanical Attachment

C. Other Standards:

1. UBC Standard No. 14-1, Kraft Waterproof Building Paper
2. ICC AC38 Acceptance Criteria for Water Resistive Barriers
3. UU-B-790 Building Paper, Vegetable Based, Kraft, waterproofed, water repellent and fireproof

1.4 SUBMITTALS

A. Submit under provisions of Section 01330 Submittal Procedures.

B. Product Data:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.
4. Sealers as per manufacturer’s requirements.

C. Selection Samples: Submit mortar color samples.

D. Verification Samples: Submit 2 manufacturer’s full-size samples of natural veneer stone for each pattern specified, and sealer when applicable

E. Verification Samples: Following initial sample selection submit “laid-up” sample board using the selected stone and mortar materials and showing the full range of colors expected in the finished Work; minimum sample size: 3 by 3 feet (1 by 1 m).

F. Quality Assurance/Control Submittals:

1. Qualifications:

a) Proof of manufacturer qualifications.
b) Proof of installer qualifications.

2. Regulatory Requirements: Evaluation reports.
3. Veneer manufacturer's installation instructions.
4. Installation instructions for other materials.

1.5 QUALITY ASSURANCE

A. Stone Producer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

B. Stone Installer Qualifications: Company specializing in performing Work of this section with minimum five years documented experience.

C. Mock-Up: Provide a mock-up for evaluation of stone, mortar color and application workmanship.

1. Finish areas designated by Architect and Owner.
2. Do not proceed with remaining work until Architect approves workmanship, color, and sheen.
3. Refinish mock-up area as required to produce acceptable work.

D. Expansion Joints: Provide expansions joints in accordance with details and as recommended by manufacturer. Confirm locations and frequency with Architect before beginning work.

E. Pre-install Meeting.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store stone on pallets or wooden crates. Pallet shall be shrink-wrapped.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install natural stone veneer under environmental conditions outside manufacturer's limits.

B. Hot and Cold Weather Requirements: ACI 530.1/ASCE 6/TMS 602.

C. Air Temperature: 40 degrees F or above during installation.

D. Mortar Mixing Water: Heat mortar mixing water when air temperature falls below 50 degrees F.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Eldorado Stone or Architect and Owner approved equal.

B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 VENEER STONE

A. Veneer Unit properties: Precast veneer units consisting of portland cement, lightweight aggregates, and mineral oxide pigments.

1. Compressive Strength: ASTM C 192 and ASTM C 39, 5 sample average: greater than 1,800 psi (12.4MPa).
2. Shear Bond: ASTM C 482: 50 psi (345kPa), minimum.
3. Freeze-Thaw Test: ASTM C 67: Less than 3 percent weight loss and no disintegration.
4. Thermal Resistance: ASTM C 177: 0.473 at 1.387 inches thick
5. Weight per square foot: 2014 FBC, ASTM C1670, 15 pounds, saturated.

B. Sizes and Shapes:

1. Stone Veneer. Broad range of colors including brown, tan, gray, buff, pink, yellow, white and black.
2. Split faces. Commonly used as an architectural stone siding for interior and exterior veneer applications.
3. Adhered Thin Veneer - 1.5 inch thick (plus or minus 0.25 inches). Lightweight (less than 15 lbs per square foot), precast stone that does not require a supporting masonry shelf. Used for interior or exterior applications such as siding, interior veneer and fireplaces:

    a) Flats.
    b) Pre-Cut Corners for the appearance of full depth stone
    c) Trim & Caps
    d) Mantels

2.3 ACCESSORIES

A. Expanded Metal Lath Paper Backed: ASTM C847; galvanized, self-furring mesh minimum 2.5 lb, backed with paper.

B. Expanded Metal Lath: ASTM C847, galvanized, self-furring, minimum 2.5 lb or 18 gauge.

C. Lath Anchorage: Tie wire, nails, screws and other metal supports, galvanized, of type and size to suit application and to rigidly secure materials in place.

D. Setting buttons or shims: Lead or plastic.

E. Joint Sealants and Joint Fillers: As specified in Section 07900.

2.4 ADHERED MASONRY VENEER INSTALLATION MATERIALS AND ACCESSORIES

A. Air and Water Barrier Membrane: LATICRETE® Air & Water Barrier ** to be thin, cold applied, single component liquid and load bearing. Waterproofing Membrane to be non-toxic, non-flammable, and non-hazardous during storage, mixing, application and when cured or approved equal:

1. Air Barrier Test (AC 212): Pass
2. Air Permeance (ASTM E2178): Pass
3. Elongation @ break (ASTM D751): 20-30%
4. 7 day Tensile Strength (ANSI A118.10): >265 psi (1.8 MPa)
5. 7 day Shear Bond Strength (ANSI A118.10): >200 psi (1.4 MPa)
6. 28 Day Shear Bond Strength (ANSI A118.4): >214 psi (1.48 – 2.4 MPa)
7. Service Rating (TCA/ASTM C627): Extra Heavy
8. Total VOC Content: < 0.05 mg/m3

B. Epoxy Waterproofing Flashing Mortar: LATAPOXY® Waterproof Flashing Mortar to be 3 component epoxy, trowel applied specifically designed for use under adhered masonry veneer:

1. Breaking Strength (ANSI A118.10): 450-530 psi (3.1-3.6 MPa)
2. Waterproofness (ANSI A118.10): No Water penetration
3. 7 day Shear Bond Strength (ANSI A118.10): 110-150 psi (0.8-1 MPa)
4. 28 Day Shear Bond Strength (ANSI A118.10): 90-120 psi (0.6–0.83 MPa)
5. 12 Week Shear Bond Strength (ANSI A118.10): 110-130 psi (0.8-0.9 MPa)
6. Total VOC Content: <3.4 g/L
7. Color to match stone.

C. Cementitious backer board units: size, thickness and installation as specified by cement backer board manufacturer, complying with ANSI A118.9 at interior walls.

D. Latex-Portland Cement Mortar for leveling beds and scratch/plaster coats: LATICRETE MVIS Premium Mortar Bed or approved equal to meet the following physical requirements:

1. Compressive Strength (ANSI A118.4 Modified): >4000 psi (27.6 MPa)
2. Water Absorption (ANSI A118.6): ≤ 5%
3. Service Rating (TCA/ASTM C627): Extra Heavy
4. Smoke & Flame Contribution (ASTM E84 Modified): 0
5. Total VOC Content: < 0.05 mg/m^3

6. Color to match stone

E. Latex Portland Cement Mortar: MVIS Hi Bond Veneer Mortar ** to be weather, frost, shock resistant, non-flammable and meet the following physical requirements:

1.Compressive strength (ANSI A118.4): >2500 psi (17.2 MPa)
2. Bond strength (ANSI A118.4): >450 psi (3.1 MPa)
3. Smoke & Flame Contribution (ASTM E84 Modified): 0
4. Total VOC Content: < 0.05 mg/m^3

F. Latex Portland Cement Pointing Mortar / Grout: MVIS Pointing Mortar to be weather, frost and shock resistant, as well as meet the following physical requirements:
1. Compressive Strength (ASTM C91): 3500 psi (24.1 MPa)
2. Smoke & Flame Contribution (ASTM E84 Modified): 0
3. Total VOC Content: < 0.00 mg/m^3

G. Expansion and Control Joint Sealant: MVIS Silicone Sealant to be a one component, neutral cure, exterior grade silicone sealant and meet the following requirements:

1. Tensile Strength (ASTM C794): 280 psi (1.9 MPa)
2. Hardness (ASTM D751; Shore A): 25 (colored sealant) /15 (clear sealant)
3. Weather Resistance (QUV Weather-ometer): 10000 hours (no change)

H. Spot Bonding Epoxy Adhesive: LATAPOXY 310 Stone Adhesive (Standard or Rapid Grade) for installing adhered masonry veneer, brick and stone over vertical and overhead surfaces shall be high strength, high temperature resistant, non-sag and shall meet the following physical requirements:

1. Thermal Shock Resistance (ANSI A118.3): >1000 psi (6.9 MPa)
2. Water Absorption (ANSI A118.3): 0.1 %
3. Compressive Strength (ANSI A118.3): >8300 psi (57.2 MPa)
4. Shear Bond Strength (ANSI A118.3 Modified): >730 psi (5 MPa)

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Do not begin installation until backing structure is plumb, bearing surfaces are level and substrates are clean and properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Examination: Examine conditions and proceed with work in accordance with Section 01700.
1. Verify that field conditions are acceptable and are ready to receive work.
2. Verify items provided by other Sections of work are properly sized and located.
3. Verify that built in items are in proper location and ready for roughing into masonry work.
4. Verify correct product prior to installation.

5. Verify that masonry and concrete substrates do not have residual coatings (paint, bond breaker, curing compounds, etc.) present, which may affect bonding of mortar to substrate.

    a. Install metal lath if residual coatings are present on substrate.

6. Consult Owner and manufacturer if deficiencies exist. Correct deficiencies in accordance with stone manufacturer's recommendations.

D. Protect surrounding area from possible damage during installation work.

E. Initiating installation constitutes Installer's acceptance of existing surfaces and substrate.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION OF ADHERED MASONRY THIN VENEER - MORTARED JOINTS

A. General: Install in accordance with current versions of American National Standards Institute, Inc. (ANSI) "A108 American National Standard Specifications for Installation of Ceramic Tile" and TCNA "Handbook for Ceramic Tile Installation." Cut and fit adhered masonry veneer neatly around corners, fittings, and obstructions. Perimeter pieces to be minimum half unit of stone. Maintain masonry courses to uniform dimensions. Form vertical and horizontal joints of uniform thickness. Install divider strips at junction of flooring and dissimilar materials.

B. Lath & Plaster Method: Install cleavage membrane / water resistive barrier complying with current revision of ANSI A108.02 (3.8 Membrane or cleavage membrane). Install metal lath complying with the current revision of ANSI A108.01 (3.3 Requirements for lathing and portland cement plastering), ANSI A108.02 (3.6 Metal lath) and A108.1A (1.0 – 1.2, 1.4, & 5.1). Apply latex-portland cement mortar as scratch/leveling coat over wire lath, concrete or masonry in compliance with current revision of ANSI A108.01 (3.3.5.1) and A108.1A (1.4). Float surface of scratch/leveling coat plumb, true and allow mortar to set until firm. For installation of adhered masonry veneer follow Direct Adhere Method (§ 3.3 D).

C. Direct Adhere Method to Install Masonry Veneer: Install latex portland cement mortar in compliance with current revisions of ANSI A108.02 (3.11), A108.1B and ANSI A108.5. Use the appropriate trowel notch size to ensure proper bedding of the adhered masonry veneer, selected so that 100% coverage of the back surface of the Thin Adhered Veneer is achieved. Work the latex portland cement mortar into good contact with the substrate and comb with notched side of trowel. Spread only as much latex portland cement mortar as can be covered while the mortar surface is still wet and tacky. When installing large format (>8" x 8"/200mm x 200mm) units, spread latex portland cement mortar onto the back of (i.e. 'back-butter') each piece/unit in addition

to troweling latex portland cement mortar over the substrate. Beat each piece/unit into the latex portland cement mortar with a beating block or rubber mallet to insure 100% full bedding and flatness. Allow installation to set until firm. Clean excess latex portland cement mortar from adhered masonry veneer face and joints between pieces.

1. Pattern Bond:

    a. Layout work in advance and distribute color range of stone uniformly over total work area.
    b. Lay stone with face exposed.
    c. Take care to avoid concentration of any one color to any one wall surface.
    d. Maintain uniform joints, as stone allows.
    e. Do not use stacked vertical joints.

D. Expansion and Control Joints: Provide control or expansion joints as needed per the manufacturers installation requirements.

1. Substrate joints must carry through, full width, to surface of adhered masonry veneer.
2. Install expansion joints in adhered masonry veneer work over construction/cold joints or control joints in substrates.
3. Install expansion joints where adhered masonry veneer abut restraining surfaces (such as perimeter walls, curbs, columns), changes in plane and corners.
4. Joint width and spacing depends on application and should be determined by the project design team.
5. Joint width: ≥ ⅛” (3mm) and ≤ 1” (25mm).
6. Joint width: depth ~2:1 but joint depth must be ≥ ⅛” (3mm) and ≤ ½” (12mm).
7. Layout (field defined by joints): 1:1 length: width is optimum but must be ≤ 2:1. Remove all contaminants and foreign material from joint spaces/surfaces, such as dirt, dust, oil, water, frost, setting/pointing materials, sealers and old sealant/backer. Use LATICRETE Latasil™ 9118 Primer for underwater and permanent wet area applications, or for porous stone (e.g. limestone, sandstone etc.) installations. Install appropriate backing material (e.g. closed cell backer rod) based on expansion joint design and as specified in § 07920. Apply masking tape to face of adhered masonry veneer, brick or stone veneer. Use caulking gun, or other applicator, to completely fill joints with sealant. Within 5-10 minutes of filling joint, ‘tool’ sealant surface to a smooth finish. Remove masking tape immediately after tooling joint. Wipe smears or excess sealant off the face of adhered masonry veneer or other absorptive surfaces immediately.

G. Adjusting: Correction of defective work for a period of one (1) year following substantial completion, return to job and correct all defective work. Defective work includes, without limitation, adhered masonry veneer units stones broken in normal abuse due to deficiencies in setting bed, loose grout/pointing mortar, and all other defects which may develop as a result of poor workmanship.

1. Control and Expansion Joints:

a. Keep joints open and free of debris.
b. Coordinate control joints as specified in Section 07 90 00 for sealant performance.

2. Sealant Recesses:
   a. Provide open joints 3/4 inch deep and 1/4 inch wide, where masonry meets doors, windows, and other exterior openings.
   b. Coordinate sealant joints as specified in Section 07 90 00 for sealant performance.

3. Cutting and Fitting:
   a. Cut and fit thin veneer stone for chases, pipes, conduit, sleeves, grounds, and other penetrations and adjacent materials.
   b. Coordinate with other work to provide correct size, shape, and location.

4. During progress of the work, cover top of unfinished stone masonry work for protection from weather.

3.4 INSTALLATION BUILDING VENEER

A. Install building veneer stone and mortar in accordance with manufacturer's instructions and ACI 530.1/ASCE 6/TMS 602.

B. Maintain masonry courses to uniform dimensions. Form vertical and horizontal joints of uniform thickness.

3.5 CLEANING

A. Keep face of stone free of mortar as work progresses.

B. If residual mortar is on face of stone, allow to dry partially and brush mortar off surface and sponge off residue.

C. When work is completed and mortar has set for 2 to 3 days, clean surface from top to bottom using mild masonry detergent acceptable to natural stone manufacturer.

D. Do not use harsh cleaning materials or methods that could damage stone.

E. Do not use metal brushes or acids for cleaning.

3.6 PROTECTION

A. Protect installed natural stone veneer to ensure that, except for normal weathering, stone will be without damage or deterioration at time of Substantial Completion.

B. Touch-up, repair, or replace damaged stone before Substantial Completion.

END OF SECTION 04412

SECTION 04810 - UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Concrete masonry units.
2. Mortar and grout.
3. Steel reinforcing bars.
4. Masonry-joint reinforcement.
5. Ties and anchors.
6. Miscellaneous masonry accessories.

B. Products Installed but not Furnished under This Section:
1. Cast-stone trim in unit masonry.

C. Related Requirements:
1. Section 051200 "Structural Steel Framing" for installing anchor sections of adjustable masonry anchors for connecting to structural steel frame.
2. Section 07190 "Water Repellents" for water repellents applied to unit masonry assemblies.
3. Section 07620 "Sheet Metal Flashing and Trim" for exposed sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Precast Concrete Sill Units: Show sizes, profiles, and locations of each precast unit required.
3. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
4. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

1.6 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
   1. Submittal is for information only. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

B. Qualification Data: For testing agency.

C. Material Certificates: For each type and size of the following:
   1. Masonry units.
      a. Include data on material properties.
      b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
   2. Cementitious materials. Include name of manufacturer, brand name, and type.
   3. Mortar admixtures.
   4. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
   5. Grout mixes. Include description of type and proportions of ingredients.
   6. Reinforcing bars.
   7. Joint reinforcement.
   8. Anchors, ties, and metal accessories.

D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
   1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
   2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.

F. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

B. Mockups: Build mockups to verify to set quality standards for materials and execution.
   1. Build mockup of typical wall area.
   2. Build mockups for typical exterior and interior walls in sizes approximately 72 inches long by 48 inches high by full thickness.
      a. Include lower corner of window opening, framed with precast sill units, at upper corner of exterior wall mockup. Make opening approximately 12 inches wide by 16 inches high.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
   1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
   2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
   1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
   2. Protect sills, ledges, and projections from mortar droppings.
   3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
   4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
   1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
   1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
   2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

2.3 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet vertically and horizontally of a walking surface.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
   1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.4 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
   1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
   2. Provide bullnose units for outside corners unless otherwise indicated.

B. CMUs: ASTM C 90.
   1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi.
   2. Density Classification: Normal weight.
   3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
   4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
   5. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

2.5 MASONRY LINTELS

A. General: Provide one of the following:

B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.6 PRECAST SILL UNITS

A. Precast Concrete: Compressive strength 4,000 - 6,000 PSI at 28 days, with portland white cement conforming to ASTM C-150.

B.

1. Reinforcing M13 #4, Grade 60 rebar.
2. Aggregate-Fine carefully graded and washed natural sand conforming to ASTM C-33.
3. Shape as indicated on the drawings.

2.7 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
   1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
   1. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
   2. Pigments shall not exceed 10 percent of portland cement by weight.

D. Aggregate for Mortar: ASTM C 144.
   1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
   2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
   3. White-Mortar Aggregates: Natural white sand or crushed white stone.
   4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

E. Aggregate for Grout: ASTM C 404.

F. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for glazed or pre-faced masonry units (and approved for such use by manufacturer of units); in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's colors.

G. Refractory Mortar Mix: Ground fireclay or non-water-soluble, calcium aluminate, medium-duty refractory mortar that passes ASTM C 199 test; or an equivalent product acceptable to authorities having jurisdiction.

H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      a. BASF Corporation.
      b. Euclid Chemical Company (The); an RPM company.

I. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.

J. Water: Potable.

2.8 REINFORCEMENT

A. Uncoated-Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

C. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.
1. Interior Walls: Hot-dip galvanized carbon steel.
2. Exterior Walls: Hot-dip galvanized carbon steel.
3. Wire Size for Side Rods: 0.187-inch diameter.
4. Wire Size for Cross Rods: 0.148-inch diameter.
5. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
6. Provide in lengths of not less than 10 feet , with prefabricated corner and tee units.

D. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods.

2.9 TIES AND ANCHORS

A. General: Ties and anchors shall extend at least 1-1/2 inches into masonry but with at least a 5/8-inch cover on outside face.

B. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch-diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.
2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.

C. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.060-inch-thick steel sheet, galvanized after fabrication.

2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.
3. Corrugated-Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.060-inch-thick steel sheet, galvanized after fabrication with dovetail tabs for inserting into dovetail slots in concrete.

D. Partition Top Anchors: 0.105-inch-thick metal plate with a 3/8-inch-diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

E. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.
1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

F.

2.10 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.11 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime mortar unless otherwise indicated.
3. For exterior masonry, use portland cement-lime mortar.
4. For reinforced masonry, use portland cement-lime mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
   1. For masonry below grade or in contact with earth, use Type M.
   2. For reinforced masonry, use Type M or Type S.
   3. For mortar parge coats, use Type S or Type N.
   4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
   5. For interior non-load-bearing partitions, Type O may be used instead of Type N.
      a.

D. Grout for Unit Masonry: Comply with ASTM C 476.
   1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
   2. Proportion grout in accordance with ASTM C 476, paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
   3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
   2. Verify that foundations are within tolerances specified.
   3. Verify that reinforcing dowels are properly placed.
   4. Verify that substrates are free of substances that impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested according to ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:
   1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
   2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
   3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:
   1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
   2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
   3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
   4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
   5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
   6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet or 1/2-inch maximum.
   7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:
   1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
   2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.

3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
1. Install compressible filler in joint between top of partition and underside of structure above.
2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.

3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

A. Lay CMUs as follows:
1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Install clay flue liners to comply with ASTM C 1283. Install flue liners ahead of surrounding masonry. Set clay flue liners in full bed of refractory mortar 1/16 to 1/8 inch thick. Strike joints flush on inside of flue to provide smooth surface. Maintain expansion space between flue liner and surrounding masonry except where surrounding masonry is required to provide lateral support for flue liners.

D. Set precast sill units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Allow cleaned surfaces to dry before setting.
3. Wet joint surfaces thoroughly before applying mortar.
4. Rake out mortar joints for pointing with sealant.

E. Rake out mortar joints at pre-faced CMUs to a uniform depth of 1/4 inch and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.

F. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
1. For glazed masonry units, use a nonmetallic jointer 3/4 inch or more in width.

G. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

H. Cut joints flush where indicated to receive waterproofing or air barriers unless otherwise indicated.

3.6 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
   1. Space reinforcement not more than 16 inches o.c.
   2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
   3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
   1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
   2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
   3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.8 CONTROL JOINTS

A. General: Install control-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry using one of the following methods:
   1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
   2. Install preformed control-joint gaskets designed to fit standard sash block.
   3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
   4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

C. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch.

D.

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.
2.

3.9 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.
1.

3.10 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength.

F. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

G. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

H. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.

I. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

J. Prism Test: For each type of construction provided, according to ASTM C 1314 at 28 days.

3.12 PARGING

A. Parge exterior faces of below-grade masonry walls, where indicated, in two uniform coats to a total thickness of 3/4 inch. Dampen wall before applying first coat and scarify first coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom.

C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.13 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
   3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
   4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
   5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
   6. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
   7. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
   8. Clean stone trim to comply with stone supplier's written instructions.
   9. Clean limestone units to comply with recommendations in ILI's "Indiana Limestone Handbook."

3.14 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
   1. Crush masonry waste to less than 4 inches in each dimension.
   2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
   3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

C. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

D. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04810

SECTION 05312- ARCHITECTURAL(ACOUSTICAL) CEILING DECK SYSTEM

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Architecturally exposed and acoustical metal-ceiling-deck system and accessories. Acoustical perforated panels to be used at interior applications, and non-perforated & non acoustical panels to be used at exterior canopies.

1.3 RELATED SECTIONS

A. Section 05310 - Steel Decking.

B. Section 05500 - Metal Fabrications.

C. Section 07210 – Building Insulation.

D. Section 07411 – Metal Roof Panels

E. Section 07250 - Weather Barriers.

1.4 REFERENCES

A. AAMA 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) & Zinc- Aluminum Coated Steel Substrates.

B. ASTM A 621 - Standard Specification for Forming Steel (FS), Sheet and Strip, Carbon, Hot-Rolled

C. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

D. ASTM A 780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

E. ASTM A 792 - Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process

F. ASTM A 924/A 924M - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

G. ASTM B 117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.

H. ANSI/ASTM C 423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

I. ASTM D 523 - Standard Test Method for Specular Gloss.

J. ASTM D 968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.

K. ASTM D 4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films

L. ASTM D 2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates

M. ASTM D 3363 - Standard Test Method for Film Hardness by Pencil Test

N. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials

O. AISI - North American Specification for the Design of Cold-Formed Steel Structural Members.

P. ICC-ES Evaluation Report ESR-3477 - New Millennium Versa-Wedge Steel Deck Hangers.

Q. AWS D1.3 - Structural Welding Code - Sheet Steel.

R. SDI Code of Standard Practice - 2014

S. SDI RD - Standard for Steel Roof Deck

T. SDI SPD2 - Standard Practice Details with enhanced aesthetic standards established and adopted by the Manufacturer with enhanced aesthetic standards established and adopted by the Manufacturer.

U. SDI MOC2 - Manual of Construction with Steel Deck

V. UL 580 - Tests for Uplift Resistance of Roof Assemblies.

W. UL - Certification Directory.

1.5 DESIGN / PERFORMANCE REQUIREMENTS

A. Ceiling-deck system assembly specified shall comply with the following:
   1. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's North American Specification for the Design of Cold-Formed Steel Structural Members.
   2. AAMA 621, Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) & Zinc- Aluminum Coated Steel Substrates
   3. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   4. ASTM A 792 - Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated

by the Hot-Dip Process.

5. ASTM A 924/A 924M - Standard Specification for General Requirements for Steel Sheet, Metallic- Coated by the Hot-Dip Process.
6. ANSI/ASTM C 423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
7. ICC - ES Evaluation Report(s) for conformance with the 2012, 2009 and 2006 International Building Code.
8. SDI Publication No.31 - Design Manual for Composite Decks, Form Decks and Roof Decks with enhanced aesthetic standards established and adopted by the Manufacturer.
9. SDI MOC2 - Manual of Construction with Steel Deck.
10. SDI SPD2 - Standard Practice Details with enhanced aesthetic standards established and adopted by the Manufacturer with enhanced aesthetic standards established and adopted by the Manufacturer.
11. UL Certification's Directory.
12. UL 580 - Tests for Uplift Resistance of Roof Assemblies.

B. Ceiling-deck system assembly specified shall meet the following performance characteristics:
   1. Superimposed service-phase design loads and locations applied to assembly shall be established and approved by the Architect and the Engineer of Record (EOR).
   2. When design loads vary in magnitude and location over the deck surfaces, conform with the EOR's design Drawings denoting the distribution and intensity of the varying loads.
   3. Uniform Live Load Requirements: Submit certified design confirming the uniform live load carrying capacities of the steel deck section(s).
      a. Design Loads: Minimum 20 lbs./ft.2 or greater as indicated on the Drawings.
   4. Concentrated Load Requirements: Submit certified design confirming the concentrated load carrying capacities of the steel deck section(s).
      a. Design Loads: 250 lbs applied at mid-span in the installed condition or greater as indicated on the Drawings.
   5. Diaphragm Load Requirements: Submit certified design confirming the shear strength and stiffness capacities of the steel deck section(s).
      a. Design Loads: As directed indicated on the Drawings.
      b. Ultimate Wind Uplift Requirements: Submit certified design confirming the wind uplift capacities of the steel deck section(s).
         1) Design Loads: Minimum -49.9 lbs./ft.2 or greater as indicated on the Drawings.
   6. Deflection Limits: Maximum deflection of steel deck section(s) subjected to uniformly applied or concentrated loading shall not exceed the lesser of 1/240th of span length or 1 inch (25 mm) or less as indicated on the Drawings.
   7. Allowance for Thermal Movement: Deck cladding system assembly shall accommodate in-plane thermal contraction and expansion movements based on design data indicated on the Drawings.

1.6 SUBMITTALS

A. Submit under provisions of Section 01330 – Submittal Procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Deck property information for the proposed deck units.
   2. Preparation instructions and recommendations.
   3. Storage and handling requirements and recommendations.
   4. Erection instructions.

C. Shop Drawings: Show location, connections, bearing on supports, methods of anchoring, coordination of the fastener locations of the structural insulated roof deck panels, attachment of accessories, adjusting plate details and the manufacturer's erection instructions and pertinent details.

D. Shop Drawings:
   1. Showing plans, sections, elevations, layouts, profiles and product component locations, including anchorage, bracing, fasteners, accessories and finishes, sealed by a Professional Engineer registered in the state of the project.
   2. Indicate component details, framed openings, bearing, anchorage, loading, welds, type and location of fasteners, and accessories.
   3. Indicate method for securing studs and other components to tracks and for framing connections.
   4. Submit calculations for loadings and stresses under Professional engineer's seal registered in the state of the project.

E. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

F. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

G. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.7 QUALITY ASSURANCE

A. Manufacturer with documented evidence of not less than 10 years of successful experience in the placement of architecturally exposed ceiling-deck systems on projects of similar size, scope and end use.

B. Installer Qualifications: Company certified by the manufacturer and specializing in performing Work of this section with minimum 5 years documented experience.

C. Welding: Qualify procedures and personnel according to AWS D1.3, Structural Welding Code - Sheet Steel.

D. Design structural elements under direct supervision of Professional Engineer experienced in design of this Work and registered in the state of the project.

E. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, and manufacturer's installation instructions.

F. Welding Standards: Comply with applicable provisions AWS D1.1 and AWS D1.3 of the Structural Welding Code.

G. Qualify welding processes and welding operators in accordance with AWS Standard Qualification Procedure.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store products in compliance with Manufacturer's printed recommendations.

B. Separate sheets and store on dry wood sleepers; slope for positive drainage. Protect with a waterproof covering and ventilate to avoid condensation.

C. Handle factory-painted deck panel surfaces with utmost care during lifting, unbundling. separating, spreading and placement phases. Work shall be performed in a manner that minimizes abrasion between sheets and between painted surfaces and structural supports.

1.9 SEQUENCING

A. Coordinate installation of sound-absorbing insulation strips and non-corrosive spacers (lath when required) in the ribs of cellular acoustical deck to ensure protection of insulation strips against damage from effects of weather and other causes.

1.10 WARRANTY

A. Provide with the paint manufacturers 20 year film integrity limited warranty against cracking, peeling, checking or flaking under normal anticipated conditions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: New Millennium Building Systems, which is located at: 7575 W. Jefferson Ave.; Fort Wayne, IN 46804 ; Tel: 260-969-3500; Fax: 260-868-6002; Email: request info (info@newmill.com) or Architect approved equal.

B. Substitutions: Not permitted.

2.2 ARCHITECTURAL CEILING DECK

A. Materials General:
1. Minimum Thickness: 20 GA (0.0359-inch) or greater as determined by design.
2. Minimum Yield Strength: 40,000-1b/inch2.
3. Protective Coating: Galvanized (zinc) coating weight.
a. G-90

B. Deck Panel Type: Provide the following deck type(s) to the applications indicated on the Drawings.
1. Type: Versa-Dek 2.0 S ES, 2 inches deep re-entrant (dovetail) rib-shaped panel sections without longitudinal stiffener.
a. Type: Standard deck with the following.
1) Removable access panels.
2) Acoustical treatments.
b. Depth: 2 inches.
c. Pitch: 6 inches.
d. Cover Width: 24 inches.
e. Side-lap Formation: Nestable, self-aligning.

2. Type: Cellular Linear Panels: Linear Panels:
   a. Steel Materials:
      1) Thickness: Minimum 20 GA or greater as determined by design.
      2) Minimum Yield Strength: 40,000-1b/inch2.
   b. Appearance: Flat with continuous longitudinal minor stiffening ribs uniformly spaced 6 inches apart.
   c. Attachment to Deck Panel Sections:
   d. Method: Resistive Spot Welding process.
      1) Weld size and spacing as determined by Manufacturer to assure unified, composite strength.
3. Removable Access Covers:
   a. Factory roll formed to tightly match bottom formation of the ceiling-deck panel section. Cover to assure a smooth transition of aesthetic surfaces.
   b. Locations: One each per ceiling penetration denoted on the Reflected Ceiling Plans or as required for access to equipment based on architect's approval of the panel location. Position ceiling penetration at mid-length of access cover. Maximum 3 penetrations per deck span spaced minimum 2 feet apart.
   c. Length: 7 feet maximum.
   d. Identification: Labels placed on the non-exposed side marked to correspond to positions denoted on the approved ceiling deck installation drawings.
   e. Paint Coatings: Paint to match coating system applied to exposed ceiling-side of deck panel sections.
   f. Modifications to Ceiling-deck Panel Sections:
      1) Openings: Factory clean cut, rectangular, one per ceiling-deck penetration.
      2) Length: As required to assure adequate clearance for access and attachment of field assembled service lines and equipment; Maximum 6 feet.
      3) Reinforcement of deck panels: As determined by Manufacturer to re-establish structural properties, if required.
4. Screws: Low profile, pan-head type of size and quantity as determined by Manufacturer.
5. Intermediate Support Devices for Service Lines and/or Equipment Between Factory Cut Openings:
   a. Manufacturer's Designation: Dek Strut brackets.
   b. Factory installed.
6. Length: Deck panel sections shall be installed in lengths to create two-span, three-support conditions.
7. Sections not installed in minimum two-span lengths shall be as indicated on the ceiling-deck system installation drawings.
   a. Minimum end bearing: 1-1/2-inch.
   b. Spacing and attachment as determined by Manufacturer.

C. Acoustical Treatments: Architectural ceiling deck (Interior applications only, non-perforated panels at exterior canopies).
1. Acoustical Properties:
   a. NCR Rating:
      1) Versa-Dek 2.0 S ES Acoustical = 0.95- 1.15
2. Acoustical Insulation Batts:

a. Factory and Field installed.
b. Factory and Field installed over non-corrosive plastic lath spacer.
1) Type: Unwrapped fiberglass, formaldehyde free.
2) Density: 3.0 lblft3.
3) Dimensions: Size as determined by Manufacturer to assure minimum NRC rating value required.

D. Paint Coatings: Manufacturer shall apply uniform, factory-applied coatings, combining steel sheet, passivation, pre-treatment primer and finish top-coat paint where specified to deck panel sections. Coatings shall comply with AAMA 621.
1. Non-architecturally exposed side deck panel surfaces:
a. Continuous coil-coated and oven-cured:
1) Versa-Cote Ultra G-P.
2. Architecturally exposed ceiling-side deck panel surfaces: Protect pre-finished deck with craft-paper interleafing between deck panel surfaces.
3. Interior application shall be wood grained simulated finish, as selected from manufacture’s full range wood grained colors.
4. Exterior application shall be solid color white.

E. Fasteners
1. Welded attachment of any architectural ceiling-deck system assembly component is not permitted unless expressly allowed in writing by manufacturer.
2. Mechanical fasteners for deck panel to support steel not exceeding 3/16 inch (5 mm) thickness and deck panel side-lap attachments. All fasteners shall be concealed and not exposed at the finish face of the panel.
a. Hex-head, self-drilling screws with 300 series stainless steel over hex washer head with integrated EDPM washer; thermo-set polyester film over zinc-plated carbon steel shanks and powder paint coated heads color matched to the top-coat paint finish of the deck panels
b. Buildex "SCOTS"; AD Cladding; Use in aggressive environments thermo-set polyester film over zinc-plated carbon steel heads and shanks, integrated EPDM washer and powder paint coated heads color matched to the top-coat paint finish of the deck panels.
c. Buildex "MAX1SEAL"; AD Cladding; Use in non-aggressive environments thermo-set polyester film over zinc-plated carbon steel heads and shanks
d. Buildex "TEKS"; Use in non-aggressive interior deck ceiling applications.
e. Screws attaching two steel components with a combined material thickness less than 0.095-inch shall possess back-out resistant threads.
f. Size, Spacing and Location: As indicated in ceiling-deck system installation drawings.
3. Type: Mechanical fasteners for deck panels to support steel equal to or greater than 3/16 inch thick:
a. Description: Powder-actuated pins with integral washer and knurled shanks of diameter and length matched by Pin Manufacturer to the steel support member's base thickness.
b. Size, Spacing and Location: As indicated in ceiling-deck system installation drawings.

F. Accessories:

1. Provide Ridge and Valley Plates, Butt Plates, Z-Closures, Finish Strips, Sump Pans and Cell Closures as required.
2. Use size, spacing and location as indicated in ceiling-deck system installation drawings

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not install roof deck until supporting construction is in place.

B. Examine support framing and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work of this section.

C. If supporting construction is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Locate deck bundles to prevent overloading of support members.

3.3 INSTALLATION - GENERAL

A. Install deck panels and accessories in accordance with the Contract Documents approved installation drawings and requirements of this Section. Fasteners shall not be exposed at the finish face of the decking.

B. Place each deck panel on structural supports and adjust to final position with accurately aligned side laps and ends butted over structural supports to assure minimum specified end bearing length.

C. Cut and neatly fit deck units and accessories around openings and other work projecting through or adjacent to the decking.

D. Deck Panel Attachments to structural supports, deck side-lap, and deck perimeter edge attachments: Attach with fasteners of the type, size and spacing indicated on the ceiling-deck system installation drawings immediately after panel placement and alignment. Welded attachment of any architectural ceiling-deck system assembly component is not permitted unless expressly allowed in writing by Manufacturer. If allowed, specification language covering the execution of weld fastening shall accompany the written approval.
   1. Minimum Fastening Requirements:
      a. Fasten deck panels to supports as indicated on the ceiling-deck system installation drawings using mechanical fasteners, powder-actuated pins or self-drilling screws.
      b. Fasten side-laps of deck panel sections as indicated on the ceiling-deck system installation drawings. Fasten side-laps with No. 10 diameter self-drilling screws.
      c. Fasten perimeter edges of deck panels at maximum 12 inch on center intervals or as indicated on the ceiling-deck system installation

drawings. Use mechanical fasteners, powder-actuated pins or self-drilling screws.

2. Accessory Attachments: Anchor accessories to supporting members with self-drilling screws at 12 inches on center intervals or as Indicated on the ceiling-deck system installation drawings.

E. Reinforce unscheduled openings cut through roof deck in accordance with SDI MOC2 or as indicated on the ceiling-deck system Installation drawings or the structural drawings.

F. Do not expose the insulation batts to snow, rain, or condensation. Remove and replace any wet insulation.

3.4 INSPECTION AND REPAIR

A. Remove dirt and debris from entire deck surfaces before installation of any topping material.

B. Prior to the application of the roof covering, inspect completed portions of the ceiling-deck system assembly and correct any deficiencies and/or damage to the surface. Replace decking that has been damaged.

C. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint.

D. Repair Painting: Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Stainless Steel Corner Guards.
2. Metal bollards.
3. Miscellaneous angles, tubes, and steel shapes as required for the work to be furnished and installed (i.e. glue-laminated timber, counters, benches, etc.)

B. Related Sections:

1. Division 3 Section "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts and other items cast into concrete.
2. Division 5 Section "Structural Steel".

1.3 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

2. Plan showing corner guard locations and heights.

B. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer, registered in the State of Florida, responsible for their preparation.

C. Prime Paint and Galvanizing Coating Product Data.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified professional engineer, registered in the State of Florida.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.7 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes. All fabrications shall be prime painted with zinc rich primer. Fabrications that are not fully concealed shall be painted in accordance with Division 9 “Interior Painting.”

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Tubing: ASTM A 500, cold-formed steel tubing.

2.3 NONFERROUS METALS

A. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.

B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

C. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.4 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for interior use at stainless steel applications. Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless-steel fasteners for fastening aluminum.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3; with hex nuts, ASTM A 563, Grade C3; and, where indicated, flat washers.

D. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1.

E. Eyebolts: ASTM A 489.

F. Machine Screws: ASME B18.6.3.

G. Lag Screws: ASME B18.2.1.

H. Plain Washers: Round, ASME B18.22.1.

I. Lock Washers: Helical, spring type, ASME B18.21.1.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

D. Concrete: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 4000 psi.

2.6 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections and Drawings as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

C. Prime miscellaneous interior framing and supports with zinc-rich primer unless otherwise specified in Division 9 Section “Interior Painting.” Galvanize fabrications for

exterior use with G90 coating.

2.8 METAL BOLLARDS

A. Fabricate metal bollards from 1/4-inch wall-thickness round steel tubing.
   1. Bollards to be concrete filled will be fabricated with holes for concrete fill application and galvanizing and provided with a vinyl sleeve cover to match existing.

B. Hot-dip galvanize after fabrication.

C. Plastic Cover: Polyethylene Thermoplastic (HDPE) tubes having ultra-violet resistance and antistatic properties, normal thickness 0.250 inches. Color shall be OHSA yellow unless otherwise noted. Size covers for pipe diameters.

2.9 STAINLESS STEEL CORNER GUARDS

A. Stainless steel corner guards Type 304, 16 gauge, 2” x 2”, with vertical grain-brushed finished – No. 4 – full wall height unless noted otherwise.

B. Factory applied two sided tape or field applied construction adhesive.

2.10 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products at all exterior locations.

   1. G90 coating.

   2. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

   3. Touch-up galvanized coating after field welding is completed.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

   1. Shop prime with unless zinc-rich primer is indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment,

and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, epoxy set anchors, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 INSTALLING METAL BOLLARDS

A. Fill metal-capped bollards solidly with concrete where noted on the Drawings and allow concrete to cure seven days before installing.

B. Anchor bollards in concrete. Fill annular space around bollard solidly with nonshrink, nonmetallic grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch toward bollard.

C. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

3.4 INSTALLING CORNER GUARDS

A. Examination:
1. Examine areas and conditions in which the corner guard systems will be installed.
2. Complete all finishing operations, including painting, before beginning installation of corner guards.
3. Wall surface shall be dry and free from dirt, grease and loose particles.

B. Preparation:

1. General: Prior to installation, clean substrate to remove dust, debris and loose particles.

C. Installation:
1. General: Locate the Corner Guard as indicated on the Architect accepted shop drawing for the appropriate substrate and install corner guard level and plumb as the indicated on the shop drawings.
2. Installation of Stainless Steel Corner Guards

a. Surface must be dry, clean and property sealed.
b. Two-sided tape: Peel paper from the factory applied tape and apply pressure until a light fit is achieved, or; Cement on: Apply a premium heavy-duty construction adhesive in a zigzag pattern over the back of each wing of the corner guard. Position corner guard on the wall and apply pressure until a tight fit is achieved.
c. Remove the protection plastic covering from the exposed surface of the corner guard.

D. Cleaning

1. At completion of the installation, clean surfaces with a natural based, non-abrasive cleaner. Ammonia and alcohol based cleaners may be used.

END OF SECTION 05500

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SECTION 06105 – MISCELLANEOUS CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Provisions and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Rough carpentry work not specified elsewhere and generally intended for support of other work.
2. Wood furring/blocking
3. Wood equipment bases.
4. Miscellaneous blocking, grounds, nailers, and panels.
5. Plywood panels.
6. Custom decorative polyurethane brackets

B. Particle Board and MDF is not acceptable as a substitute for plywood.

C. Related Sections include the following:

1. Division 6 Section “Interior Finish Carpentry”.

2. Division 7 Section “Sheet Metal Flashing and Trim” and Roof Accessories”

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.

4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
6. Florida product approval or engineered documents for exterior cladding and decorative elements.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Powder-actuated fasteners.
5. Expansion anchors.
6. Metal framing anchors.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

B. Quality Standard: Comply with AWI AWS for grades of architectural woodwork, construction, finishes, and other requirements. Provide AWI certification labels or AWI certificates of compliance indicating that woodwork meets requirements of grades specified.

Surface Burning Characteristics Provide materials with the following characteristics as determined by testing identical products per ASTM test method indicated below by Underwriters Laboratories, Inc. (UL), Intertek Testing Services (ITS), Hardwood Plywood and Veneer Association (HPVA), or another inspecting and testing agency acceptable to authorities having jurisdiction.

1. Surface burning characteristics shall not exceed values indicated or required by Local Codes and tested per ASTM E 84.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack material above ground level on uniformly spaced supports to prevent deformation.

B. For material pressure treated with waterborne chemicals, place spacers between each bundle for air circulation.

C. Remove or loosen plastic wrappings. Sticker individual panels to hasten acclimatization.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

A. Standards: Furnish lumber manufactured to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.

B. Grade Stamps: Furnish lumber with each piece factory-marked with grade stamp of inspection agency that indicates grading agency, grade, species, moisture content at time of surfacing, and mill.

1. Sizes: Provide nominal sizes indicated, complying with PS 20 except where actual sizes are specifically noted as being required.

C. Surfacing: Dressed lumber, S4S, unless otherwise indicated.

D. MDF or particle board is not acceptable.

2.2 DIMENSION LUMBER FOR CONCEALED CONDITIONS

A. Species: Any wood species listed by PS 20.

B. Moisture Content: S-DRY, KD 19 or MC 19 (19 percent maximum moisture content).

C. Grade: No. 2 or standard grade.

2.3 DIMENSION LUMBER FOR EXPOSED CONDITIONS

A. Species: Any wood species listed by PS 20.

B. Moisture Content: S-DRY, KD 19 or MC 19 (19 percent maximum moisture content).

C. Grade: No. 2 or standard grade.

2.4 BOARDS FOR CONCEALED CONDITIONS

A. Species: Any wood species listed by PS 20.

B. Moisture Content: S-DRY, KD 19 or MC 19 (19 percent maximum moisture content).

C. Grade: No. 2, 2 Common, or Construction Boards.

2.5 BOARDS FOR EXPOSED CONDITIONS

A. Species: Any wood species listed by PS 20.

B. Moisture Content: S-DRY, KD 19 or MC 19 (19 percent maximum moisture content).

C. Grade: No. 2, 2 Common, Construction Common, or Construction Boards.

2.6 BOARDS FOR WET CONDITIONS

A. Boards for wet conditions, such as base cabinets with sinks or subject to wetting shall be constructed of Marine Grade Plywood.

B. Species: Douglas fir or Western Larch

C. Moisture Content: S-Dry, KD 19 or MC 19 (19 percent maximum moisture content).

D. Grade: All plies of veneer shall be B or better – (B-B Marine Grade).

E. The exposure durability rating is “Exterior” and the glue used shall be fully waterproof structural adhesive.

2.7 CONSTRUCTION PANELS

A. Standards: Comply with requirements of PS 1 Voluntary Product Standard "Construction and Industrial Plywood" for veneer plywood and APA PRP-108 "Performance Standards and Policies for Structural-Use Panels" for performance-rated panels.

1. Trademark: Furnish construction panels that are each factory-marked with APA trademark for grade specified.

B. Miscellaneous Exposed Plywood: DOC PS 1, A-D Interior, thickness as indicated but not less than ½-inch.

C. Miscellaneous Concealed Plywood: C-C Plugged Exterior, thickness as indicated but not less than ½-inch nominal.

D. Electrical/Telephone Backing Panels: C-D Plugged, Exposure 1 plywood panels, fire-retardant treated, thickness as indicated but not less than ¾” inch nominal. (4’-0” X 8’-0”)

2.8 FASTENERS

A. General: Where miscellaneous carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of AISI Type 304 stainless steel.

B. Nails, Wire, Brads and Staples: FS FF-N-105.

C. Bolts: ASTM A 307, Grade A; with ASTM A 563 hex nuts and flat washers.

D. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

2.9 PRESERVATIVE WOOD TREATMENT BY PRESSURE PROCESS

A. General: Obtain preservative-treated lumber complying with AWPA Standard C2. Mark each treated item with AWPB or SPIB Quality Mark Requirements. Coat surfaces cut after treatment to comply with AWPA M4.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Above-Ground Wood Treatment: Pressure treat with waterborne preservatives to a minimum retention of 0.25 pcf.

1. Kiln-dry interior dimension lumber after treatment to 19 percent maximum moisture content.
2. Treat wood items indicated and in the following circumstances:

a. In contact with roofing, flashing, or waterproofing.
b. In contact with masonry or concrete.
c. Within 18 inches of grade.

C. Ground-Contact Wood Treatment: Pressure treat with waterborne preservatives to a minimum retention of 0.40 pcf.

2.10 FIRE-RETARDANT TREATMENT BY PRESSURE PROCESS

A. General: Identify treated wood with appropriate classification marking of Underwriters Laboratories Inc. or other testing and inspection agency acceptable to authorities having jurisdiction.

B. Dimension Lumber: Comply with AWPA C20.

1. Treatment Types: Interior Type A for protected wood and Exterior Type for wood exposed to weather.

C. Plywood: Comply with AWPA C27.

1. Treatment Types: Interior Type A for protected wood and Exterior Type for wood exposed to weather.

D. Inspect each piece after drying and discard damaged or defective pieces.

2.11 DECORATIVE POLYURETHANE BRACKETS

A. Custom decorative brackets based on the profile as detailed on the drawings, as manufactured by Fypon Inc., or Architect approved equal. Products to be UV resistant polyurethane.

B. Finish to be white.

PART 3 - PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Condition work to average prevailing humidity conditions in installation areas before installing. Before installing work, examine shop-fabricated work for the completion and complete work as required.

3.3 INSTALLATION, GENERAL

A. Discard units of material with defects that impair quality of miscellaneous carpentry and in sizes that would require an excessive number or poor arrangement of joints.

B. Cut and fit miscellaneous carpentry accurately. Install members plumb and true to line and level.

C. Coat cut edges of preservative-treated wood to comply with AWPA M4.

D. Securely fasten miscellaneous carpentry as indicated and according to applicable Florida building codes and recognized standards.

E. Countersink nail heads on exposed carpentry work and fill holes.

F. Use fasteners of appropriate type and length. Predrill members when necessary to avoid splitting wood.

G. Quality Standard: Install architectural woodwork to comply with AWI AWS for the same grades specified in Part 2 – Products of this Section for type of architectural woodwork involved.

H. Fire Retardant - Treated Wood: Handle, store, and install fire retardant – treated wood to comply with recommendations of chemical treatment, manufacturer, including, but not limited to, those for adhesives used to install architectural woodwork.

I. Installation Tolerances: Install architectural woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims.

3.4 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

A. Install where shown and where required for screeding or attachment of other work. Cut and shape to required size. Coordinate location with other work involved.

B. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated.

3.5 WOOD FURRING

A. General: Install at spacing indicated, with closure strips at edges and openings. Shim with wood as required for tolerance of finished work.

3.6 CONSTRUCTION PANELS

A. Comply with applicable installation recommendations in APA Form E30 "Design/Construction Guide--Residential & Commercial."

B. Install Electrical/Telephone Backing Panels as required to accommodate equipment.
   1. Obtain Fire Marshall approval and acceptance of fire-rated panels prior to painting surfaces.

3.7 ADJUSTING AND CLEANING

A. Repair damaged and defective work where possible to eliminate functional and visual defects. Where not possible to repair, replace the work.

B. Clean architectural woodwork on exposed and semi-exposed surfaces. Touch-up shop-applied finishes to restore damaged or soiled areas.

3.8 PROTECTION

A. Provide final protection and maintain conditions in a manner acceptable to the installer, that shall ensure that the work shall be without damage at time of Substantial Completion.

END OF SECTION 06105

SECTION 06202 – INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Provisions and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Interior running trim and wood veneer.

B. Related Sections include the following:

1. Division 6 Section "Miscellaneous Carpentry" for furring, blocking, and other carpentry work not specified in this Section.

C. Products furnished, but not installed, under this Section include the products listed below. Coordinating and scheduling the purchase and delivery of these products remain requirements of this Section.

1.3 DEFINITIONS

A. MDF: Medium-density fiberboard. (Shall not be used)

B. MDO Plywood: Plywood with a medium-density overlay on the face.

1.4 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect materials against weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation within and around stacks and under temporary coverings.

B. Deliver interior finish carpentry materials only when environmental conditions meet requirements specified for installation areas. If interior finish carpentry materials must

be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and applicable grading rules of inspection agencies certified by ALSC's Board of Review.

1. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
2. For exposed lumber, mark grade stamp on end or back of each piece.

B. Softwood Plywood: DOC PS 1.

C. Hardboard: AHA A135.4.

D. Marine Plywood: BS 1088, Medium Density Overlay.

E. Stain: Match Architect’s sample; the wood trim shall match the wood veneer door stain.

F. Mill unfinished aluminum: ¼ inch ga.

2.2 INTERIOR TRIM AND WOOD VENEER

A. Hardwood Moldings and veneer for Transparent Finish (Stain or Clear Finish): WMMPA HWM 2, N-grade wood moldings made to patterns included in WMMPA HWM 1. Transparent finish where scheduled or shown on the drawings match Architects sample for stain color or color selected by the Architect based on manufacturer’s full range of colors.

1. Species: White Oak to match stained doors.
2. Maximum Moisture Content: 9 percent.
3. Finger Jointing: Not allowed.
4. Matching: Selected for compatible grain and color.

B. Moldings for Opaque Finish (Painted Finish): Made to patterns included in WMMPA WM 12.

1. Hardwood Moldings: WMMPA HWM 2, P-grade.

a. Species: Yellow poplar; MDF not allowed.
b. Maximum Moisture Content: 9 percent.

2. Finger Jointing: Allowed.

2.3 MISCELLANEOUS MATERIALS

A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

1. Where galvanized finish is indicated, provide fasteners and anchorages with hot-dip galvanized coating complying with ASTM A 153/A 153M.

B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.

C. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.

2.4 FABRICATION

A. Back out or kerf backs of the following members except those with ends exposed in finished work:

1. Interior standing and running trim.

B. Ease edges of lumber to 1/16-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.

1. Do not use manufactured units with defective surfaces, sizes, or patterns.

B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Countersink fasteners, fill surface flush, and sand where face fastening is unavoidable. Where wood is scheduled to be stained or wood grain exposed, wood filler shall match wood species and shall be stainable. Fasteners shall be concealed and spaced regularly in consistent pattern @ stained wood components.
3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation.
4. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.

1. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints & fastener nail hole filler.
2. Install trim after gypsum-board joint finishing operations are completed.

3. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 ADJUSTING

A. Replace interior finish carpentry that is damaged or does not comply with requirements. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.6 CLEANING

A. Clean interior finish carpentry on exposed and semi exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

3.7 PROTECTION

A. Protect installed products from damage from weather and other causes during remainder of the construction period.

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 06202

SECTION 06402 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Plastic-laminate cabinets.
2. Solid-surfacing-material countertops and splashes and millwork.
3. Cabinet accessories.

B. Related Sections include the following:

1. Division 5 Section “Metal Fabrications”.
2. Division 6 Section "Miscellaneous Carpentry" for wood blocking required for installing woodwork and concealed within other construction before woodwork installation.
3. Division 6 Section "Interior Finish Carpentry" for interior carpentry exposed to view that is not specified in this Section.
4. Division 6 Section “Fire Retardant Treatment (Fire Retardant Treated Wood)” for fire retardant treatment for wood products.
5. Division 7 Section “Joint Sealants” for sealant schedule.
6. Division 9 Section "Interior Painting” for field applied finishes and stains.
7. Division 10 Section “Toilet Compartments” for toilet partitions and screens.

1.3 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, including cabinet hardware and accessories and finishing materials and processes.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show details full size.
2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers and other items installed in architectural woodwork.
4. Show locations of vents for computer equipment and grommets for cable wiring for power, data, and telephone equipment connections.

C. Samples for Initial Selection:

1. Shop-applied opaque finishes.
2. Plastic laminates.
3. PVC edge material.
4. Solid surface samples.
5. Cabinet Hardware samples when requested by the Architect.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and fabricator.

B. Product Certificates: For each type of product, signed by product manufacturer.

C. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.

B. Installer Qualifications: Certified participant in AWI's Quality Certification Program.

C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers.

D. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1. Provide AWI Quality Certification Program certificates indicating that woodwork, including installation, complies with requirements of grades specified.
2. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with such selections and requirements in addition to the quality standard.

E. Pre-installation Conference: Conduct conference at Project site to comply with

requirements in Division 1 Section "Project Management and Coordination."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.
2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.9 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

B. Coordinate sizes of computer equipment, or other equipment provided by the Owner, that is integral to the cabinetry work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Certified Wood: Interior architectural woodwork shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

C. Wood Products: Comply with the following:

1. Hardboard: AHA A135.4.
2. Softwood Plywood: DOC PS 1, Medium Density Overlay.
3. Marine Plywood: BS 1088, Medium Density Overlay.
4. NO PARTICLEBOARD MDF, OR FIBERBOARD SHALL BE USED.

D. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

1. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:

a. Abet Laminati, Inc.
b. Arborite; Division of ITW Canada, Inc.
c. Lamin-Art, Inc.
d. Wilsonart.
e. Nevamar Company, LLC; Decorative Products Div.

2. Color: As scheduled on the Drawings or specified to match millwork to be selected from manufacturer's full range of colors. Refer to article "Solid-surfacing Material Countertops and Integral Sinks" this section for additional information.

E. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2. "Caesarstone Quartz" or Architect and Owner approved substitution the color and properties of any proposed substitution shall be an exact match to the materials specified or scheduled, subject to the approval of the Owner.

2.2 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8 Section "Door Hardware (Scheduled by Describing Products)." Basis of Design: Hafele or Architect approved equal.

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening.

C. Wire Pulls: Back mounted, solid metal, 5 inches long, 2-1/2 inches deep, and 5/16 inch in diameter. Steel, matte nickel finish.

D. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; recessed; with shelf rests, B04081. Flush with cabinet interior face. Groove plug for wood shelves ¾" thick at book cases and ½" thick at interior cabinets.

E. Rakks Angle Counter Support Bracket EH-1818-P: Primed finish. Painted to match

wall color.

F. Drawer Slides: BHMA A156.9, B05091.

1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.

G. Grommets for Cable Passage through Countertops: 2-inch OD, black, molded-plastic grommets and matching plastic caps with slot for wire passage.

1. Product: Subject to compliance with requirements, provide "SG series" by Doug Mockett & Company, Inc. or polished edge of the through color solid surface material where approved by the Architect.

H. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base or as selected by Architect from manufacturer’s standard available finishes.

I. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

J. Kitchen/ Break Area: Under Counter Pull out Trash Cans: Concealed pull-out trash bin, heavy duty side wall mounted guides, (1) one 36 quart gray bin. Hafele –503.88.990 , or Architect approved equal.

K. Restroom Trash Bin: The pull out trash bin shall be supported and enclosed within a custom heavy gauge 316 stainless steel clad-plywood enclosure, under the counter and overhead supported by the counter top, with clear floor space below the cabinet enclosure and lockable continuous hinged stainless steel door lock shall be keyed to building standard. Refer to the drawings for profile, dimension & size of stainless steel trash bin.

2.3 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content. All concealed blocking shall be fire retardant.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

C. Adhesives, General: Adhesives shall not contain urea formaldehyde.

D. VOC Limits for Installation Adhesives: Installation adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D

(EPA Method 24):

1. Wood Glues: 30 g/L.
2. Multipurpose Construction Adhesives: 70 g/L.
3. Contact Adhesive: 250 g/L.

E. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.

1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.4 FABRICATION, GENERAL

A. Interior Woodwork Grade: Unless otherwise indicated, provide Custom -grade interior woodwork complying with referenced quality standard.

B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch.

D. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

E. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of openings in countertops with a coat of varnish.

2.5 PLASTIC-LAMINATE CABINETS

A. Grade: Custom.

B. AWI Type of Cabinet Construction: Reveal overlay Reveal overlay on face frame.

C. Reveal Dimension: 1/2 inch.

D. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:

1. Horizontal Surfaces Other Than Tops: Grade HGS.
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade HGS.
4. Edges: PVC edge banding, 012 inch thick, matching laminate in color, pattern, and finish.

E. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.

    a. Edges of Plastic-Laminate Shelves: PVC edge banding, 012 inch thick, matching laminate in color, pattern, and finish.
    b. For semi exposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS.

2. Drawer Sides and Backs: Plywood backed decorative panels or wood clear finish as selected by Architect.
3. Drawer Bottoms: Plywood backed decorative panels or wood clear finish as selected by Architect.

F. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.

G. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. Match existing millwork as approved by Architect and Owner from laminate manufacturer's full range in the following categories:

    a. Solid colors, matte finish.
    b. Solid colors with core same color as surface, matte finish.
    c. Wood grains, matte finish.
    d. Patterns, matte finish.

H. Provide dust panels of 1/4-inch plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

I. Use marine grade plywood with plastic laminate veneer for all counter tops, cabinet bases and cabinet boxes with sinks.

2.6 SOLID-SURFACING WINDOW SILLS AND RESTROOM COUNTER TOPS

A. Grade: Premium.

B. Solid-Surfacing-Material Thickness: 1/2 inch or 3/4 inch or composite thickness to achieve profiles shown on drawings. Thickness shall be built up to 1 ½" @ counter edges, top openings, and sink rims.

C. Bullnose edge: Manufacturer's standard composite bull nose edge at counter tops and window sills, 1 ½" total thickness at counter top edge and window sills; edge openings at sinks to be flush with sink and edge openings at trash chute to be 1/8" radius eased edge.

D. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid-surfacing material complying with the following requirements:

1. Basis-of-Design shall be "Caesarstone" Quartz, color for restrooms countertop shall be "6600 Nougat" color for window sill is "5000 London Grey". Multiple color selections per Architect's and Owner's selection.

2. Integral Sinks – Elkay "Quartz Classic".

E. Fabricate tops in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, silicone, sealers, fabrication, and finishing.

1. Fabricate tops with shop-applied edges of materials and configuration indicated or specified.
2. Fabricate tops with loose backsplashes for field application, at back and sides of counter tops unless noted otherwise and integral sills are scheduled or required.
3. All supporting substrates will be fully concealed, cut outs in counter tops shall be trimmed in solid surface material where cutouts are indicated on the drawings.
4. Coordinate and pre drill holes for plumbing fixtures and scheduled accessories.
5. Field verify dimensions of the countertops & template before fabrication.

F. Install integral sink bowls in countertops in shop.

G. Drill holes in countertops for plumbing fittings and soap dispensers in shop. Polish all edges.

H. Refer to Section "Joint Sealants" – Sealants for mildew resistant silicone sealant to be used at counter tops.

2.7 SHOP FINISHING

A. Grade: Provide finishes of same grades as items to be finished.

B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

C. General: Shop finish transparent-finished interior architectural woodwork at fabrication shop as specified in this Section. Refer to Division 9 painting Sections for finishing opaque-finished architectural woodwork.

D. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.

1. Back priming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require back priming when surfaced with plastic laminate, backing paper, or thermoset decorative panels.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.

C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
2. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
3. Secure backsplashes to walls with adhesive.
4. Caulk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."

H. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semi exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06402

SECTION 06703 – FIRE RETARDANT TREATMENT (FIRE RETARDANT TREATED WOOD)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes fire retardant treatment for wood, including framing, decking, sheathing and other wood construction, not exposed to weather.

B. Related Sections include the following:

1. Division 6 Section “Miscellaneous Carpentry” for wood blocking and plywood construction panels.
2. Division 6 Section “Interior Finish Carpentry.”

1.3 REFERENCES

A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title, or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation. Most recent editions should be used.

B. American Society for Testing and Materials (ASTM):

1. ASTM D 5516 Standard Test Method for Evaluating the Flexural Properties of Fire Retardant Treated Softwood Plywood Exposed to Elevated Temperatures.
2. ASTM D 5664 Standard Test Method for Evaluating the Effects of Fire-Retardant Treatments and Elevated Temperatures on Strength Properties of Fire-Retardant Treated Lumber.
3. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.

C. American Wood Protection Association (AWPA):

1. AWPA Standard P25 Standard for Waterborne Preservatives.
2. AWPA Standard P49 Fire Retardant Formulations.
3. AWPA Standard U1, Use Category System.

D. Military Specification (Mil. Spec.):

1. Mil. Spec. L-19140E Lumber and Plywood, Fire-Retardant Treated.

E. National Fire Protection Association (NFPA):

1. NFPA 255 Standard Test Method for Surface Burning Characteristics of Building Materials.

F. Underwriters Laboratories, Inc. (UL):

1. UL 723 Test for Surface Burning Characteristics of Building Materials.
2. UL Building Materials Directory.

1.4 SYSTEM DESCRIPTION

A. Performance Requirements: Provide fire retardant treatment which will perform in accordance with manufacturer's stated performance criteria without defects, damage or failure.

1.5 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Section "Submittals Procedures."

B. Product Data: Submit product data, including manufacturer's product sheet, for specified products.

C. Quality Assurance Submittals: Submit the following:

1. Test Report: Certified test report showing compliance with specified performance characteristics and physical properties. Include in test report certification that fire retardant solution does not contain ammonium phosphate.

a. Evaluation Report: National Evaluation Report ESR-1626 indicating flamespread, strength, corrosion and hygroscopic properties.

2. Certificate: Certification from treatment plant certifying wood treatment applied complies with Dricon fire retardant treatment by Arch Wood Protection.

D. Closeout Submittals: Submit the following:

1. Warranty: Warranty documents specified herein.

1.6 QUALITY ASSURANCE

A. Wood Treatment Plant Qualifications: Wood treatment plant experienced in performing work of this section which has specialized in the treatment of wood similar to that required for this project and a plant licensed by Arch Wood Protection.

1. Certificate: When requested, submit certificate indicating qualification.

B. Regulatory Requirements: Provide fire retardant treatment which complies with the following regulatory requirements:

1.7 DELIVERY, STORAGE AND HANDLING

A. General: Comply with Division 1 Section “Product Requirements.”

B. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

1.8 WARRANTY

A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

B. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty document executed by authorized company official. Manufacturer’s warranty is in addition to, and not a limitation of, other rights Owner may have under the Contract Documents.

PART 2 - PRODUCTS

2.1 FIRE RETARDANT TREATMENT

A. Manufacturer: Arch Wood Protection. (Lonza)

1. Contact: 5660 New Northside Dr. NW, Suite 1100
Atlanta, GA 30328
Telephone: (678) 627-2000

B. Product Treatment: Dricon fire retardant treatment for wood is produced by licensed treatment plant. Fire retardant chemical shall provide protection against termites and fungal decay, shall be registered for use as a wood preservative by the U.S. Environmental Protection Agency (EPA), shall comply with formulation FR-1 of the current edition of AWPA Standard P49, and shall be free of halogens, sulfates and ammonium phosphate. Treated wood shall have a flamespread of less than 25 when tested in an extended 30-minute tunnel test in accordance with ASTM E 84, NFPA 255 or UL 723.

1. Corrosion Properties: Fire retardant treated wood in contact with carbon steel, galvanized steel, aluminum, copper and red brass shall exhibit corrosion rates less than 1 mil (0.025 mm) per year when tested in accordance with Fed. Spec. MIL-L-19140, Paragraph 4.6.5.2.

2. Testing: Testing on fire performance, strength and corrosion properties of fire retardant treated wood shall be recognized by issuance of a National Evaluation Services Report.

C. Fire Retardant Treatment: Manufacturer’s solution for fire retardant treatment of wood.

1. Treatment Standard: Comply with AWPA Standard U1.

2.2 PRODUCT SUBSTITUTIONS

A. Substitutions: Substitutions permitted in accordance with Division 01 provisions, Section 01600 - Materials and Equipment.

2.3 RELATED WOOD MATERIALS

A. General: Refer to Division 6 Sections for related wood materials specified herein.

2.4 SOURCE QUALITY

A. Source Quality: Obtain fire retardant treatment from a single manufacturer.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including product technical bulletins, for fire retardant treatment installation.

3.2 APPLICATION

A. Fire Retardant Treatment: Apply a fire retardant treatment in accordance with requirements of applicable codes and manufacturer's requirements.

3.3 PROTECTION

A. Protection: Protect fire retardant treated wood from damage during construction.

END OF SECTION 06703

SECTION 07115 – BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes cold-applied, emulsified-asphalt dampproofing applied to the following surfaces:

1. Interior face of concealed masonry exterior walls and as indicated on the Drawings or scheduled.

2. Hollow metal frame bucks, concealed side of door frame.

B. Related Sections include the following:

1. Division 8 Section “Metal Doors and Frames

2. Division 9 Section “Painting”

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include recommendations for method of application, primer, number of coats, coverage or thickness, and protection course.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain primary dampproofing materials and primers through one source from a single manufacturer. Provide secondary materials recommended by manufacturer of primary materials.

1.5 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit asphalt dampproofing to be performed according to manufacturers' written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cold-Applied, Emulsified-Asphalt Dampproofing:

a. ChemMasters Corp.
b. DeGusse Building Systems, Sonneborne brand products.
c. Gardener Gibson, Inc.
d. Henry Company.
e. Karnak Corporation.
f. Koppers Industries, Inc.
g. Malarkey Roofing Company.
h. Meadows, W. R., Inc.
i. Tamms Industries.

2.2 BITUMINOUS DAMPPROOFING

A. Cold-Applied, Emulsified-Asphalt Dampproofing:

1. Trowel Coats: ASTM D 1227, Type II, Class 1.
2. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.
3. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.
4. Product shall be acceptable for use within interior space applications.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Applicator present, for compliance with requirements for surface smoothness and other conditions affecting performance of work.

1. Begin dampproofing application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protection of Other Work: Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.

B. Clean substrates of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.

3.3 APPLICATION, GENERAL

A. Comply with manufacturer's written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of dampproofing.

1. Apply additional coats if recommended by manufacturer or required to achieve coverages indicated.
2. Allow each coat of dampproofing to cure 24 hours before applying subsequent coats.

B. Apply dampproofing to provide continuous plane of protection on exterior face of exterior masonry walls.

3.4 CLEANING

A. Remove dampproofing materials from surfaces not intended to receive dampproofing.

END OF SECTION 07115

SECTION 07180 - TRAFFIC COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division / Specification Sections, apply to the Section.

1.2 SUMMARY

A. This Section includes traffic coatings for the following applications:

1. Hangar floors.

1.3 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Show extent of each traffic coating. Include details for treating substrate joints and cracks, and other termination conditions. Include layout of traffic striping and markings.

C. Samples: For each type of traffic coating required, prepared on rigid backing. Provide stepped samples on backing large enough to illustrate build-up of traffic coatings.

D. Material certificates and Installer certifications,

E. Maintenance data.

1.4 QUALITY ASSURANCE

A. Installer (Applicator) Qualifications: Applicator who is certified by manufacturer.

1. Certification: Written approval or license of applicator by traffic coating manufacturer.

B. Source Limitations: Use traffic coatings of a single manufacturer.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply traffic coatings to damp or wet substrates, when temperatures are below 40 deg F, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F above dew point.

1. Do not apply traffic coatings in snow, rain, fog, or mist, or when such weather conditions are imminent during the application and curing period. Apply only when frost-free conditions occur throughout the depth of the substrate.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace traffic coatings that fails in materials and workmanship within **five** years from date of Substantial Completion.

1. Warranty does not include deterioration or failure due to unusual weather phenomena, failure of prepared and treated substrate, formation of new substrate cracks exceeding 1/16 inch in width, fire, vandalism, or abuse by snowplow, maintenance equipment, and truck traffic.
2. Failure includes, but is not limited to, the following:

a. Adhesive or cohesive failures.
b. Abrasion or tearing failures.
c. Surface crazing or spalling.
d. Intrusion of water, oils, gasoline, grease, salt, deicer chemicals, or acids into substrate.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Material Compatibility: Provide primers; base, intermediate, and top coats; and miscellaneous materials that are compatible with one another and with substrate under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. VOC Content: Provide waterproofing and traffic paint materials that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Opaque waterproofing treatments: 400 g/L.
2. Pavement-Marking Paint: 150 g/L
3. Zone-Marking Coatings: 450 g/L.

2.2 TRAFFIC COATING

A. Basis-of-Design Product: The design for the vehicle bay floor coating is based on the product indicated below. Products by other listed manufacturers may be considered provided deviations from specifications of the product named are minor as judged by the Architect.

1. **Basis of Design: Dex-O-Tex Division /Crossfield Products Corp.- Aero-Flor III;**

2. Delta Polymers Inc.- Polythane 1005;

3. Dur-a-flex Inc.- Poly-thane #3

B. Primer: Manufacturer's standard factory-formulated primer recommended for substrate and conditions indicated.

C. Preparatory and Base Coats: Aliphatic Polyurethane coating

D. Top Coat: Aliphatic Polyurethane coating

1. Color and Gloss: As selected from manufacturer's full range of pigmented gloss and matte finishes.

E. Component Coat Thicknesses: As recommended by manufacturer for substrate and service conditions indicated, but not less than 13 mils dry film thickness (measured excluding aggregate):

F. Aggregate: Uniformly graded washed silica sand of particle sizes, shape, and minimum hardness recommended in writing by traffic coating manufacturer.

1. Spreading Rate: As recommended by manufacturer for substrate and service conditions indicated, but not less than the following:

a. Top Coat: As required to achieve slip-resistant finish.

2.3 MISCELLANEOUS MATERIALS

A. Joint Sealants: Multicomponent urethane sealant recommended in writing by manufacturer for substrate and joint conditions indicated and for compatibility with traffic coatings; complying with ASTM C 920.

PART 3 - EXECUTION

3.1 APPLICATION

A. General: Comply with manufacturer's written recommendations.

B. Verify compatibility with and suitability of substrates and that substrates are visibly dry and free of moisture.

1. Application of coating indicates acceptance of surfaces and conditions.

C. Concrete Substrates: Begin coating application only after minimum concrete curing and drying period recommended by traffic coating manufacturer has passed and after surfaces are dry.

1. Test for moisture by method recommended in writing by manufacturer.
2. Mechanically abrade concrete surfaces to a uniform profile according to ASTM D 4259. Do not acid etch.

D. Clean and prepare substrates to produce clean, dust-free, dry substrate for traffic coating application.

E. Mask adjoining surfaces not receiving traffic coatings including floor drains, hangar door rails and other substrate penetrations to prevent spillage, leaking, and migration of coatings.

F. Prepare, treat, rout, and fill joints and cracks substrates. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D 4258.

G. Start traffic coating application in presence of manufacturer's technical representative.

1. Verify that wet film thickness of each component coat complies with requirements every 100 sq. ft.
2. Prevent contamination and damage during application and curing stages.

END OF SECTION 07180

SECTION 07120 – MEMBRANE WATERPROOFING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 GENERAL

A. Furnish all labor, materials, tools, equipment, etc., and services necessary and incidental to the complete fabrication, furnishing and erection of this Section as shown, noted, detailed, necessary and reasonably implied on the drawings and in the specifications.

1.3 SUBMITTALS

A. Submit manufacturer's detailed drawings and product data under provisions of Division 1 Section “Submittal Procedures.”

B. Submit manufacturer's printed literature indicating specifications, installation, instructions and general recommendations for waterproofing.

C. Include manufacturer's warranty, certification, or other data substantiating that the materials comply with the requirements, and are recommended by the manufacturer for the application shown or specified.

D. Submit certifications according to Article 1.4 – Quality Assurance.

1.4 QUALITY ASSURANCE

A. The manufacturer of waterproof materials shall have been regularly engaged in production of these materials for a minimum of 10 years and shall have 3 similar installations with a minimum of 5 years service at each installation.

B. The applying contractor shall be an approved applicator by the manufacturer.

C. The applying contractor must request the services of an approved representative of the manufacturer for the initial instructions in preparation, mixing and application of materials. Notification shall be in writing and allow 5 days for manufacturer to comply.

1.5 JOB-SITE MEETING

A. Job-site meeting of General Contractor, Applicator, Architect and approved manufacturer's representative shall be held before any work begins, to verify all surfaces and conditions to receive membrane. All approved submittals, drawings and specifications shall be examined and coordinated with job conditions.

1.6 DELIVERY AND STORAGE

A. Deliver materials in original sealed containers, clearly marked with manufacturer's name, brand name, and type of material.

B. Store materials per manufacturer's instructions.

1.7 WARRANTY

A. Warranty waterproofing work against defects in material and workmanship, leaks or any migration of water for a period of five (5) years from the date of substantial completion. Replace or make good such defects at no additional costs during warranty period including costs of correcting adjacent work affected in any way by replacing or correcting such defects.

PART 2- PRODUCTS

2.1 MATERIALS

A. Showers, etc., as listed in Article 3.1 – Installation, General, to receive membrane waterproofing, as manufactured by Laticrete International, Inc., as follows:

1. First ply shall be 9235 liquid applied waterproof membrane.

2. Reinforcing fabric shall be Laticrete brand rot-proof, hi-tensile cloth specifically treated for use with Laticrete waterproofing materials.

3. Second ply shall be 9235 liquid applied waterproof membrane.

B. Shower pan liners are specified in Division 15 Section, and shall be provided at the shower.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. All items in this Section shall be installed by experienced mechanics and in the best workmanlike standard of this trade and in strict accordance to the manufacturer's printed instructions and approved methods.

B. Membrane shall be installed in the following locations and where shown and/or indicated on the drawings:

1. All permanent shower floors, walls, soap and shampoo coves and tiled ceilings.

3.2 INSTALLATION

A. Prior to commencing of this work, the applicator shall examine the area to be covered and advise the Contractor and Architect of any existing conditions or surface contamination that will require correction before the work commences.

B. All floor drains and other penetrations shall be in place before the work commences.

C. All horizontal surfaces or surfaces to receive membrane shall be cleaned of all oil, grease, mortar and other foreign matter before the work commences. Membrane-mesh-reinforcing shall be installed at shower seats and horizontal surfaces.

D. Membrane shall be turned up walls a minimum of 6 inches at showers.

E. Corners and joints shall receive a double ply of the membrane and mesh reinforcing in accordance with manufacturer’s standard installation procedures.

F. Membrane-mesh-reinforcing shall not be required for vertical surfaces; install fluid applied membrane to vertical surfaces per the manufacture’s installation instructions.

3.3 TESTING

A. Completed sections of horizontal surface as agreed upon by Architect and manufacturer's representative shall be tested with a minimum of 1 inch of water for 48 hours.

B. All waterproof membranes shall be allowed to cure for a period of 3-5 days prior to flood testing. Manufacturer's representative shall have final decision on number of curing days.

C. After water test is approved, surface shall be allowed to dry before other work begins. Surfaces shall be protected as recommended by manufacturer, until finish materials are installed.

3.4 MATERIAL AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and be replaced with new material in the best workmanlike manner at no extra cost to the Owner.

END OF SECTION 07120

SECTION 07190 – WATER REPELLENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes clear water-repellent coatings for the following horizontal surfaces:

1. Exterior concrete and concrete walkways, or where noted on the Drawings.

1.3 RELATED SECTIONS

A. Coordinate work of this Section with work of other Sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other Sections, including:

1. Section 03300 – Cast-In-Place Concrete.
2. Section 03481 – Precast Concrete Bollards

1.4 REFERENCES

A. ACI 308: Standard Specification for Curing Concrete.

1.5 SUBMITTALS

A. Product Data: For each product indicated.

B. Product test reports.

C. Manufacturer’s compatibility certification with other sealants and finishes specified.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer (applicator) who employs only persons trained and approved by manufacturer to apply manufacturer’s products.

B. Apply a test sample, 4 feet by 4 feet in area, at designated location for approval prior to initiation of work, and examine concrete surfaces to establish standard of acceptable surface to be sealed.

C. Pre-Installation Meetings: Conduct meeting at Project site.

1. Schedule and convene meeting a minimum of 2 weeks, prior to commencing Work of this Section.
2. Review requirements for application, including surface preparation specified under other Sections, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details, installation procedures, testing and inspection procedures, protection, and repair.
3. Discuss procedures for protecting adjacent finished Work.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard for in which Installer agrees to repair or replace water-repellent coatings that fail in materials and workmanship within ten (10) years from date of Substantial Completion. Warranty does not include deterioration or failure of coating due to unusual weather phenomena, failure of prepared and treated substrate, formation of new joints and cracks in excess of 1/16 inch in width, fire, vandalism, or abuse by maintenance equipment.

1.8 DELIVERY, STORAGE AND HANDLING

A. Comply with Section 01600 – Materials and Equipment.

B. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

C. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Store tightly sealed materials off ground and away from moisture, direct sunlight, extreme heat, and freezing temperatures.

E. Store in unopened packaging in clean, dry environmental protected from sunlight at 40 degrees F (4 degrees C) to 85 degrees F (29 degrees C) prevent material from freezing.

1.9 PROJECT CONDITIONS

A. Environmental Requirements:

1. Ensure that substrate surface and ambient air temperature are minimum of 35 degrees F (minus 7 degrees C) and rising at application time and remain above 35 degrees F (minus 7 degrees C) for at least 24 hours after application. Ensure that frost or frozen surfaces are thawed and dry.
2. Do not place surface hardener in areas without roof cover.
3. Allow surfaces to attain temperature and conditions specified before proceeding with surface hardener application.
4. Perform Work of this Section in well-ventilated areas.

PART 2 - PRODUCTS

2.1 WATER REPELLENTS

A. Silicate: Inorganic silicate-based curing, hardener and dustproofer for use on concrete either interior or exterior.Penetrating water-soluble, water-repellent, clear compound containing water, or other proprietary solvent carrier and densifier, that when applied in accordance with manufacturer's application recommendations will produce dense surface resistance to abrasion, moisture, and tire marking.

1. VOC Requirements: With 0g/L VOCs or less.

2. Products: Subject to compliance with requirements, provide one of the following:

a. BASF- Kure N Harden ® (Masterkure HD 200 WB)

b. Or approved equal, approved and accepted by the Architect and provided substitution complies with specified criteria, and resistant to staining from coffee, sodas, and markers.

PART 3 - EXECUTION

3.1 APPLICATION

A. Preparation: Clean substrate of substances that might interfere with penetration or performance of water repellents. Test for moisture content, according to water repellent manufacturer's written instructions, to ensure surface is sufficiently dry.

1. Formed Concrete: Remove oil, curing compounds, laitance, and other substances that could prevent adhesion or penetration of water repellents.

2. Clean concrete unit masonry pursuant to NCMA recommendations.

3. Application of sealer shall be evidence of substrate acceptance.

4. Remove all concrete fins, splatters, and finished concrete anomalies prior to sealer application.

B. Test for pH level, according to water repellent manufacturer's written instructions, to ensure chemical bond to silicate minerals.

C. Weather and Substrate Conditions: Do not proceed with application of water repellent under any of the following conditions, except with written instruction of manufacturer:

1. Ambient temperature is less than 40 deg F.

2. Concrete surfaces and mortar have cured for less than 28 days.

3. Rain or temperatures below 40 deg F are predicted within 24 hours.

4. Application is earlier than 24 hours after surfaces have been wet.

5. Substrate is frozen or surface temperature is less than 40 deg F.

6. Windy condition exists that may cause water repellent to be blown onto vegetation or surfaces not intended to be coated.

D. Protect adjoining work including sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is possibility of water repellent being deposited on surfaces. Cover live plants and grass.

E. Coordination with Sealants: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.

1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those used in the Work.

F. Test Application: Before performing water-repellent work, including bulk purchase and delivery of products, prepare small application in an unobtrusive location and in a manner approved by Architect to demonstrate final effect (visual, physical, and chemical) of planned application. Proceed with work only after Architect approves test application or as otherwise directed.

1. Revisions of planned application, if any, as requested by Architect, will be by Change Order if they constitute departure from requirements of the Contract Documents at time of contracting.

G. Apply heavy saturation spray coating of water repellent on surfaces indicated for treatment using low-pressure spray equipment. Comply with manufacturer’s written instructions for using airless spraying procedure, unless otherwise indicated.

H. Apply second saturation spray coating, repeating first application. Comply with manufacturer’s written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer’s technical representative if written instructions are not applicable to Project conditions.

I. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Repair damage cause by water-repellent application. Comply with manufacturer’s written cleaning instructions. Do allow residue to dry on the concrete surface or allow staining (white residue) to form.

J. After application is complete, remove protective coverings from adjacent surfaces and other protected areas.

3.2 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Provide services of a factory-authorized technical service representative to inspect and approve substrate before application and to instruct applicator on product and application method to be used.

END OF SECTION 07190

SECTION 07210 - BUILDING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Mineral-wool board insulation.

    a. Reference Drawings for UL Design options and assemblies for applicability of this product.

2. Rigid board foam (closed cell) insulation.
3. Mineral-wool blanket insulation.

    a. Reference Drawings for UL Design options and assemblies for applicability of this product.

4. Spray polyurethane foam insulation.
5. Sound batt insulation.

B. Related Sections:

1. Division 7 Section "Fire-Resistive Joint Systems" for insulation installed as part of a perimeter fire-resistive joint system.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, including, but not limited to installation instructions and attachment devices.

B. Manufacturer’s Certification: Manufacturer’s certification that product complies with the project requirements and is suitable for the use intended.

C. Manufacturer’s Thermal Performance Warranty.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

B. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.5 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

B. Manufacturer will maintain quality control during manufacturing so that the insulating product will perform as specified in test reports and ratings given in manufacturer's printed material.

C. Interior Wall Insulation shall not be produced with, or contain, any of the United States EPA regulated CFC compounds listed in the Montreal Protocol of the United Nations Environmental Program.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. All materials shall be delivered to the project site in their original unbroken containers, bearing the manufacturer's name, brand and specification designation.

PART 2 - PRODUCTS

2.1 MINERAL-WOOL BOARD INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Isolatek International.
2. Owens Corning.
3. Thermafiber.

B. Unfaced, Mineral-Wool Board Insulation: ASTM C 612; with maximum flame-spread and smoke-developed indexes of 15 and zero, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

1. Nominal density of 6 lb/cu. ft., Type II, thermal resistivity of 4.16 deg F x h x sq. ft./Btu x in. at 75 deg F.
2. Fiber Color: Darkened, where indicated.

2.2 RIGID BOARD FOAM (CLOSED CELL) INSULATION

A. Basis-of-Design: Subject to compliance with requirements, provide The Dow Chemical Company; Styrofoam Brand Z-Mate Extruded Polystyrene Foam Insulation.

B. Material Properties:

1. Rigid closed-cell extruded polystyrene foam insulation.
2. Comply with ASTM C 578-95, Type X, density 1.35 lb/cu. ft. min., compressive strength 15 psi (ASTM D 1621-94).
3. Thermal resistance: 5-year aged R-values of 5.4 and 5.0 min. °F-ft^2-h/Btu^2/inch at 40°F and 75° respectively (ASTM C 518-91).
4. Water absorption: Max. 0.1% by volume (ASTM C 272-91).
5. Surface Burning Characteristics:

a. Flame Spread: 15 or less.
b. Smoke Developed: 165.

C. Thickness: (R-5)/inch; Refer to Drawings for composite “R” value of the assembly.

2.3 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Guardian Building Products, Inc.
2. Johns Manville.
3. Owens Corning.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

C. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:

1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

2.4 MINERAL-WOOL BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Fibrex Insulations Inc.
2. Owens Corning.
3. Thermafiber.
4. Johns Manville.

B. Unfaced, Mineral-Wool Blanket Insulation: ASTM C 665, Type I (blankets without

membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

2.5 SPRAY POLYURETHANE FOAM INSULATION

A. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dow Chemical Company (The).
b. BASF Corporation.
c. Henry Company.

2. Minimum density of 1.5 lb/cu. ft., thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F.

2.6 SOUND ATTENUATION BATTS

A. Sound attenuation batts shall be unfaced glass fiber insulation and have been tested in accordance with ASTM C665, Type 1, ASTM E-84 and ASTM C-423, as manufactured by Owens Corning Corp. or approved equal.

B. Material thickness and locations shall be, but not limited to, the following:

1. 2-12 inch thick (NRC = .85): for all waste and drain pipes, and rainwater leaders in all walls.
2. 3-1/2 inch thick (NRC = 1.05): for sound walls, dropped ceilings of that same space as above, dropped ceilings at all bathrooms, and conference rooms, at a minimum. Refer to Drawings for extent.

2.7 ACOUSTICAL SEALANT (CAULKING)

A. Sealant shall be a non-hardening, non-drying and non-bleeding acoustical sealant as manufactured by TREMCO Sealant Systems or USG Sealant for use at sound walls only.

2.8 STYROFOAM PANELS

A. Styrofoam panels shall be STYROFOAM 60 High Load (roofs) and Square Edge XPS (walls), in 2.5 inch thickness as manufactured by Dupont or approved equal.

2.9 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with

self-locking washer in place.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
   b. Gemco; Spindle Type.

2. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.

B. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of 1 inch between face of insulation and substrate to which anchor is attached.

1. Product: Subject compliance with requirements, provide one of the following:

   a. Gemco; Clutch Clip.

C. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. AGM Industries, Inc.; TACTOO Adhesive.
   b. Gemco; Tuff Bond Hanger Adhesive.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

B. Verify that masonry joints are struck flush and that other conditions are satisfactory for proper installation.

C. Remove concrete fins and mortar projections that interfere with placement of insulation boards.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left

exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Mineral-Wool Insulation: Reference Drawings for UL Design options and assemblies for installation of mineral-wool insulation as required.

C. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed, and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

D. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.4 INSTALLATION OF BOARD INSULATION

A. Install board insulation where indicated on Drawings according to manufacturer's written instructions.

1. Hold insulation in place by securing metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place. Maintain cavity width of dimension indicated between insulation and wall face.
2. Install 2-furring channels vertically at 24” o.c., fit insulation boards between the furring channels.
3. Insulate around plumbing fixtures with a compatible spray foam insulation.
4. Seal the space between STYROFOAM Brand Z-MATE Extruded Polystyrene Foam Insulation and window frames with latex acrylic sealant.

3.5 INSTALLATION OF SOUND ATTENUATION BATTS

A. Sound batts shall be installed between metal studs continuous from floor slab to bottom of slab at ceiling.

B. Wrap and tape around piping, conduit, and duct work to provide an unbroken barrier.

C. Batts shall be butted tight at all joints and securely put into place.

D. Extend & overlap sound batts a minimum of 4’-0” beyond face of sound rated walls that do not extend to the structure.

3.6 INSTALLATION OF ACOUSTICAL SEALANT

A. Install sealant around perimeters of all code required fire rated sound-rated wall, including vertical surfaces, floors and ceilings.

B. Install sealant around all electrical outlet and switch boxes, and where pipes and conduit pass through code required sound-rated walls.

3.7 INSTALLATION OF STYROFOAM PANELS

A. STYROFOAM 60 High Load (roofs) and Square Edge XPS (walls) shall be installed as detailed, shown and/or indicated on the drawings or as specified; roof applications shall comply with wind load requirements.

3.8 MATERIAL AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and be replaced with new material in the best workmanlike manner at NO EXTRA COST to the Owner.

3.9 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07210

SECTION 07250 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Weather barrier membrane system, including manufacturer's accessories for cement siding and framed stucco and metal lath assemblies.

B. Fasteners

1.3 REFERENCES

A. ASTM International

1. ASTM C 920; Standard Specification for Elastomeric Joint Sealants
2. ASTM C 1193; Standard Guide for Use of Joint Sealants
3. ASTM D 882; Test Method for Tensile Properties of Thin Plastic Sheeting
4. ASTM D 1117; Standard Guide for Evaluating Non-woven Fabrics
5. ASTM E 84; Test Method for Surface Burning Characteristics of Building Materials
6. ASTM E 96; Test Method for Water Vapor Transmission of Materials
7. ASTM E 1677; Specification for Air Retarder Material or System for Framed Building Walls
8. ASTM E2178; Test Method for Air Permeance of Building Materials
9. ASTM E2357; Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

B. AATCC – American Association of Textile Chemists & Colorists

1. Test Method 127 Water Resistance: Hydrostatic Pressure Test

C. TAPPI

1. Test Method T-410; Grams of Paper and Paperboard (Weight per Unit Area)
2. Test Method T-460; Air Resistance of Paper (Gurley Hill Method)

1.4 SUBMITTALS

A. Refer to Section 01330 Submittal Procedures.

B. Product Data: Submit manufacturer current technical literature for each component of the system.

C. Samples: Weather Barrier Membrane, minimum 8-1/2 inches by 11 inch.

D. Quality Assurance Submittals

1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.
2. Manufacturer Instructions: Provide manufacturer's written installation instructions.
3. Manufacturer's Field Service Reports: Provide site reports from authorized field service representative, indicating observation of weather barrier assembly installation.

E. Closeout Submittals

1. Refer to Section 01780 Closeout Submittals.
2. Weather Barrier Warranty: Manufacturer's executed warranty form with authorized signatures and endorsements indicating date of Substantial Completion. Warranty period 10 years.

1.5 QUALITY ASSURANCE

A. Qualifications

1. Installer shall have experience with installation of weather barrier assemblies under similar conditions.
2. Installation shall be in accordance with weather barrier manufacturer's installation guidelines and recommendations.
3. Source Limitations: Provide weather barrier and accessory materials produced by single manufacturer.

B. Mock-up

1. Install mock-up using approved weather barrier assembly including fasteners, flashing, tape and related accessories per manufacturer's current printed instructions and recommendations. Mock up may be integrated into work.
2. Contact manufacturer's designated representative and Architect prior to weather barrier assembly installation, to perform required mock-up visual inspection and analysis as required for warranty.

C. Pre-installation Meeting

1. Refer to Section 01310 Project Management and Coordination.
2. Hold a pre-installation conference, two weeks prior to start of weather barrier installation. Attendees shall include Contractor, Architect, installer, Owner or Owner's designated representative, and weather barrier manufacturer's designated representative.

3. Review all related project requirements and submittals, status of substrate work and preparation, areas of potential conflict and interface, availability of weather barrier assembly materials and components, installer's training requirements, equipment, facilities and scaffolding, and coordinate methods, procedures and sequencing requirements for full and proper installation, integration and protection.

1.6 DELIVERY, STORAGE AND HANDLING

A. Refer to Section 01600 Product Requirements.

B. Deliver weather barrier materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Store weather barrier materials as recommended by weather barrier manufacturer.

1.7 SCHEDULING

A. Review requirements for sequencing of installation of weather barrier assembly with installation of other building elements and flashings to provide a weather-tight barrier assembly.

B. Schedule installation of weather barrier materials and exterior cladding within nine months of weather barrier assembly installation.

1.8 WARRANTY

A. Refer to Section 01740 Warranties and Bonds, and Section 01770 Closeout Procedures.

B. Special Warranty

1. Weather barrier manufacturer's warranty for weather barrier for a period of ten (10) years from date of purchase.
2. Pre-installation meetings and jobsite observations by weather barrier manufacturer for warranty is required prior to assembly installation.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. DuPont; 4417 Lancaster Pike, Chestnut Run Plaza 728, Wilmington, DE 19805; 1-800-44-TYVEK (8-9835); http://www.construction.tyvek.com

B. Basis of Design: spunbonded polyolefin, non-woven, non-perforated, weather barrier is based upon DuPont™ Tyvek® CommercialWrap® D and related assembly

components and accessories, or equal approved by the Architect. Dupont™ fluid applied “WB+” weather barrier and flashings will be acceptable in lieu of weather barrier wrap material/sheet.

C. Performance Characteristics:

1. Air Penetration: 0.001 cfm/ft^2 at 75 Pa when tested in accordance with ASTME2178. Type 1 when tested in accordance with ASTM E 1677. ≤0.04 cfm/ft @ 75 Pa when tested in accordance with ASTM E2357.
2. Water Vapor Transmission: 30 perms, when tested in accordance with ASTM E 96, Method B.
3. Water Penetration Resistance: 235 cm when tested in accordance with AATCC Test Method 127.
4. Basis Weight: 2.4 oz/yd^2, when tested in accordance with TAPPI Test Method T-410.
5. Air Infiltration Resistance: Air infiltration at >750 seconds, when tested in accordance with TAPPI Test Method T-460.
6. Tensile Strength: 33/41 lbs/in., when tested in accordance with ASTM D 822 , Method A.
7. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E 84. Flame Spread: 15, Smoke Developed: 25.

D. Other manufacturers and product substitutions will be considered for approval in accordance with Section 01600 Materials and Equipment, and that are approved by the Architect.

2.2 ACCESSORIES

A. Seam Tape: 3” DuPont™ Tyvek® Tape as distributed by DuPont or Architect approved weather barrier manufacturer’s seam tape, or fluid applied flashings for the sprayed-fluid applied weather barrier system.

B. Fasteners:

1. Steel Frame Construction DuPont™ Tyvek® Wrap Cap Screws: 1-5/8 inch rust resistant screw with 2-inch diameter plastic cap fasteners, or Architect approved weather barrier manufacturer’s fastener and cap screw system.

C. Sealants

1. Refer to Section 07920 Joint Sealants for additional requirements.
2. Provide sealants that comply with ASTM C 920, elastomeric polymer sealant to maintain watertight conditions.
3. Products:

   a. DuPont™ Commercial Sealant.
   b. Sealants recommended by the weather barrier manufacturer.

D. Adhesives:

1. Provide adhesive recommended by weather barrier manufacturer.
2. Products:

    a. Liquid Nails® LN-109
    b. Denso Butyl Liquid
    c. 3M High Strength 90
    d. Adhesives recommend by the weather barrier manufacturer.

E. Primers:

1. Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing.

2. Products:

    a. 3M High Strength 90
    b. Denso Butyl Spray
    c. Permagrip 105
    d. Primers recommended by the flashing manufacturer

F. Flashing, as required to meet manufacturer's system assembly for complete system. Flashings listed below are based on the Basis of Design, provide approved weather barrier manufacturer flashings.

1. DuPont™ FlexWrap™: Flexible membrane flashing materials for window openings and penetrations.
2. DuPont™ FlexWrap™ NF: Flexible membrane flashing materials for window openings and penetrations.
3. DuPont™ StraightFlash™: Straight flashing membrane materials for flashings and sealing penetrations such as masonry ties, etc.
4. DuPont™ Thru-Wall Surface Adhered Membrane with Integrated Drip Edge: Thru-Wall flashing membrane materials for flashing at changes in direction or elevation (shelf angles, foundations, etc.) and at transitions between different assembly materials.
5. Preformed Inside and Outside Corners and End Dams as distributed by DuPont: Preformed three-dimensional shapes to complete the flashing system used in conjunction with DuPont™ Thru-Wall Flashing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

3.2 INSTALLATION - WEATHER BARRIER

A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations

B. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.

C. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level

D. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacturer.

E. Openings: Extend weather barrier completely over openings.

F. Overlap weather barrier

1. Exterior corners: minimum 12 inches.
2. Seams: minimum 6 inches.

G. Weather Barrier Attachment:

1. Framed Construction: Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommend fasteners, space 6 -18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.

H. Apply 4 inch by 7 inch piece of weather barrier flashing manufacturer approved alternate to weather barrier membrane prior to the installation cladding anchors.

3.3 SEAMING

A. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.

B. Seal any tears or cuts as recommended by weather barrier manufacturer.

3.4 OPENING PREPARATION

A. Flush cut weather barrier at edge of sheathing around full perimeter of opening.

B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.5 FLASHING

A. Install flashing in accordance with manufacturer's requirements and standards. Coordinate flashing with other building elements.

B. Cut 9-inch wide DuPont™ FlexWrap™ or DuPont™ FlexWrap™ NF a minimum of 12 inches longer than width of sill rough opening.

C. Cover horizontal sill by aligning DuPont™ FlexWrap™ or DuPont™ FlexWrap™ NF edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.

D. Fan DuPont™ FlexWrap™ at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges. Mechanically fastening DuPont™ FlexWrap™ NF is not required.

E. Apply 9-inch wide strips of DuPont™ StraightFlash™ at jambs. Align flashing with interior edge of jamb framing. Start StraightFlash™ at head of opening and lap sill flashing down to the sill.

F. Spray-apply primer to top 6 inches of jambs and exposed sheathing.

G. Install DuPont™ FlexWrap™ or DuPont™ FlexWrap™ NF at opening head using same installation procedures used at sill. Overlap jamb flashing a minimum of 2 inches.

H. Coordinate flashing with other building elements.

I. Position weather barrier head flap across head flashing. Adhere using 4-inch wide DuPont™ StraightFlash™ over the 45-degree seams.

3.6 THRU-WALL FLASHING INSTALLATION

A. Apply primer per manufacturer's written instructions.

B. Install preformed corners and end dams bedded in sealant in appropriate locations along wall.

C. Starting at a corner, remove release sheet and apply membrane to primed surfaces in lengths of 8 to 10 feet.

D. Extend membrane through wall and leave ¼ inch minimum exposed to form drip edge.

E. Roll flashing into place. Ensure continuous and direct contact with substrate.

F. Lap ends and overlap preformed corners 4 inches minimum. Seal all laps with sealant.

G. Trim exterior edge of membrane 1-inch and secure metal drip edge per manufacturer's written instructions.

H. Terminate membrane on vertical wall. Terminate into reglet, counterflashing or with termination bar.

I. Apply sealant bead at each termination.

3.7 THRU-WALL FLASHING / WEATHER BARRIER INTERFACE AT BASE OF WALL

A. Overlap thru-wall flashing with weather barrier by 6-inches.

B. Mechanically fasten bottom of weather barrier through top of thru-wall flashing.

C. Seal vertical and horizontal seams with tape or sealing membrane.

3.8 FIELD QUALITY CONTROL

A. Notify manufacturer’s designated representative to obtain periodic observations of weather barrier assembly installation.

3.9 PROTECTION

A. Protect installed weather barrier from damage.

END OF SECTION 07250

SECTION 07260 - VAPOR RETARDER

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Products supplied under this section:

1. Vapor barrier and installation accessories for installation under concrete slabs.

1.2 SUMMARY

A Furnish all labor, materials, tools, equipment, etc. and services necessary and incidental to the complete fabrication, furnishing and erection of this Section as shown, noted, detailed, necessary and reasonably implied on the drawings and specifications at all new cast-in-place slab on grade concrete floors and pavement.

B. Where existing concrete slab-on-grade floors are removed or demoed for new work, install new vapor retarder.

1.3 RELATED SECTIONS

A. Division 2 – Site Work

B. Section 02361 – Termite Control

C. Section 03300 – Cast-in-place Concrete

1.4 REFERENCES

A. ASTM D 882 – Tensile Properties of Thin Plastic Sheeting.

B. ASTM D 1709 – Impact Resistance of Plastic Film by the Free-Falling Dart Method.

C. ASTM D 2582 – Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting.

D. ASTM D 3776 – Mass per Unit Area (Weight) of Woven Fabric.

E. ASTM D 4833 – Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

F. ASTM E 96 – Water Vapor Transmission of Materials.

G. ASTM E 1643 – Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

H. ASTM E 1745 – Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.

I. ACI 302.2R-06 – Guide for Concrete Slabs that Receive Moisture Sensitive Flooring Materials.

1.5 SUBMITTAL DATA AND SAMPLES

A. Submit product data under provisions of Section 01300 – Shop Drawings, Product Data and Samples.

B. Submit manufacturer's data describing products, product samples, installation procedures, a schedule of locations, and details of joint and construction penetrations.

1. Summary of test results per paragraph 9.3 of ASTM E 1745.
2. Manufacturer’s installation instructions for placement, seaming and penetration repair instructions.
3. All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.

1.6 STORAGE AND PROTECTION

A. Deliver materials to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and protection shall be in accordance with Section 01600 – Materials and Equipment.

1.7 WARRANTY

A. Refer to Section 01740 – Warranties and Bonds.

PART 2 – PRODUCTS

2.1 MEMBRANE VAPOR RETARDER

A. Comply with applicable portions of the Florida Building Code for minimum requirements for vapor barriers and dampproofing.

B. Provide products from the manufacturers listed below. Products of other manufacturers will be considered under standard substitution procedures. See Section 01600 – Materials and Equipment.

C. Underslab Membrane:

1. Vapor barrier shall have all of the following qualities:

a. Maintain permeance of less than 0.01 Perms [grains/(ft^2 · hr · inHg)] as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
b. Other performance criteria:

1) Strength: ASTM E1745 Class A.
2) Thickness: 15 mils minimum

2. Basis-of-Design Product: Stego Wrap 15 mil. Underslab membrane by Stego Industries, LLC; www.stegoindustries.com, 1-877-464-7834.

3. Alternate Manufacturer's:

a. Griffolyn Vaporguard by Reef Industries, Inc.

b. Perminator- 15mil. by W.R. Meadows

c. Other Manufacturers approved by the Architect.

D. Seem/Penetration & Perimeter Tape: Polyethylene, self-adhering type, 2-inches wide, compatible with sheet material as recommended by the membrane manufacturer. Perimeter tape shall be manufacturer's standard double-sided, or term bar may be used. Do not use Duct Tape; Provide manufacturer's approved system components.

E. Mastic: Manufacturer's standard mastic or sealant.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

A. All items in this Section shall be installed by experienced mechanics of this trade, in the best workmanlike manner of this trade's best standard practice and in strict accordance with the manufacturer's printed instructions.

3.2 PREPARATION

A Ensure that subsoil is approved by Architect or Geotechnical Engineer.

1. Level and compact base material.

3.3 VAPOR RETARDER INSTALLATION

A. Vapor retarder shall be placed over firmly compacted fill, lapping in direction concrete will be placed. Lap a minimum of 6 inches and seal laps, edges and cuts water tight with self-adhering tape. Place reinforcing steel and electrical conduit above membrane. If any tears result, mend with self-adhering tape sealed down watertight.

B. Vapor retarder for walls shall be placed and anchored per manufacturers recommendations and lapped a minimum of 6 inches and sealed, edges and cuts water tight with self-adhering tape.

3.4 MATERIAL AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and replaced with new material in the best workmanlike manner at no extra cost to the Owner.

END OF SECTION 07260

SECTION 07411 - METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Standing-seam metal roof panels.
2. Metal soffit panels.

B. Related Sections:

1. Division 5 Section "Steel Deck" for steel roof deck supporting metal roof panels.
2. Division 7 Section "Joint Sealants" for field-applied sealants not otherwise specified in this Section.
3. Division 7 Section “Building Insulation” for closed cell insulation.

1.3 DEFINITIONS

A. Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight roofing system.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Metal roof panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Delegated Design: Design metal roof panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of roof area when tested according to ASTM E 1680 at the following test-pressure difference:

1. Test-Pressure Difference: Positive and negative 1.57 lbf/sq. ft..
2. Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbf/sq. ft. and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.

3. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.

D. Water Penetration: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:

1. Test-Pressure Difference: 20 percent of positive design wind pressure, but not less than 6.24 lbf/sq. ft. and not more than 12.0 lbf/sq. ft.
2. Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbf/sq. ft. and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.
3. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.

E. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.

F. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with the wind-uplift-resistance class indicated on the drawings.

G. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F , ambient; 180 deg F, material surfaces.

H. Thermal Performance: Provide insulated metal roof panel assemblies with thermal-resistance value (R-value) indicated when tested according to ASTM C 518.

I. Energy Performance: Provide roof panels with solar reflectance index not less than 29 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of roof panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, side-seam and endlap joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work. Composite insulation sheathing foot nor location coordination with metal decking flutes to ensure fasteners are not exposed within finish face of the metal decking

1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches :

a. Flashing and trim

b. Gutters
c. Downspouts
d. Rainchains

C. Delegated-Design Submittal: For metal roof panel assembly indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation, licensed in the State of Florida.

D. Coordination Drawings: Roof plans, drawn to scale, on which the following are shown and coordinated with each other, based on input from installers of the items involved:

1. Roof panels and attachments
2. Roof-mounted items including roof hatches, equipment supports, pipe supports and penetrations, lighting fixtures, snow guards, and items mounted on roof curbs

E. Manufacturer Certificates: Signed by manufacturer certifying that roof panels comply with energy performance requirements specified in "Performance Requirements" Article.

1. Submit evidence of meeting performance requirements.

F. Qualification Data: For qualified Installer, professional engineer and testing agency.

G. Material Certificates: For thermal insulation, from manufacturer.

H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

I. Field quality-control reports.

J. Maintenance Data: For metal roof panels to include in maintenance manuals.

K. Warranties: Samples of special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

C. Source Limitations: Obtain each type of metal roof panels from single source from single manufacturer.

D. Surface-Burning Characteristics: Provide metal roof panels having insulation core material with the following surface-burning characteristics as determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

E. Fire-Resistance Ratings: Where indicated, provide metal roof panels identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
2. Combustion Characteristics: ASTM E 136.

F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical roof eave, including fascia, and soffit; approximately four panels wide by full eave width, including insulation, underlayment, attachments, and accessories.
2. Apcceptance of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

G. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect and Owner's designated representative, testing and inspecting agency representative, metal roof panel Installer, metal roof panel manufacturer's representative, deck Installer, and installers whose work interfaces with or affects metal roof panels including installers of roof accessories and roof-mounted equipment.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal roof panel installation, including manufacturer's written instructions.
4. Examine deck substrate conditions for compliance with requirements, including flatness and attachment to structural members.
5. Review structural loading limitations of deck during and after roofing.
6. Review flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
7. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.
8. Review temporary protection requirements for metal roof panel assembly during and after installation.
9. Review roof observation and repair procedures after metal roof panel installation.
10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal roof panels, and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.

B. Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.

E. Protect foam-plastic insulation as follows:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit metal roof panel work to be performed according to manufacturer's written instructions and warranty requirements.

B. Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication.

1.9 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

B. Coordinate metal roof panels with rain drainage work, flashing, trim, and construction of decks, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace metal roof panel assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.

b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

A. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 ; structural quality.
2. Surface: Smooth, flat finish.
3. Exposed Coil-Coated Finish:

a. 2-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

4. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil .

B. Panel Sealants:

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; and as recommended in writing by metal roof panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.2 FIELD-INSTALLED THERMAL INSULATION-PLYWOOD PANEL COMPOSITE

A. Extruded-Polystyrene Closed CEU Board Insulation: ASTM C 578, Type IV, 1.60-lb/cu. ft. minimum density unless otherwise indicated; with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively. 0.02 perm. R-30 minimum. Plywood Composite - Exterior grade sheathing bonded to the closed cell insulation.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Utilize sheet at eaves and valleys and penetrations. 30 to 40 mils thick minimum, consisting of slip-resisting, polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 240 deg F ; ASTM D 1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F ; ASTM D 1970.
3. Products: Subject to compliance with requirements, provide the following:

    a. Carlisle Coatings & Waterproofing Inc., Div. of Carlisle Companies Inc.; CCW WIP 300HT.
    b. Grace Construction Products; a unit of Grace, W. R. & Co.; Ultra.
    c. Henry Company; Blueskin PE200 HT.
    d. Metal-Fab Manufacturing, LLC; MetShield.
    e. Owens Corning; WeatherLock Metal High Temperature Underlayment.

2.4 MISCELLANEOUS MATERIALS

A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Exposed fasteners will not be acceptable.

B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.5 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips and fasteners in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.

B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and mechanically seaming panels together.

1. Basis-of-Design Product: Subject to compliance with requirements, provide ATAS, International Inc., 1 ½" "Field Lok" Lap Seam metal panel or comparable product by one of the following:

a. AEP-Span.
b. Englert, Inc.

2. Material: Aluminum-zinc alloy-coated steel sheet, 22 gauge nominal thickness.

a. Exterior Finish: Kynar 500 PVDF.
b. Color: As selected from Manufacture's full range of colors.

3. Batten: Same material, finish, and color as roof panels.
4. Clips: Floating to accommodate thermal movement.

a. Material: 0.028-inch- nominal thickness, aluminum-zinc alloy-coated steel sheet.

5. Joint Type: As standard with manufacturer.
6. Panel Coverage: 16 ½ inches (minimum).
7. Panel Height: 1 ½ inches.

2.6 METAL SOFFIT PANELS

A. General: Provide factory-formed metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.

B. Flush-Profile Metal Soffit Panels: Solid panels formed with vertical panel edges and flat pan between panel edges; with flush joint between panels.

1. Basis-of-Design Product: Subject to compliance with requirements, provide ATAS International; Opaline Panels or comparable product by one of the following:

2. Material: Aluminum-zinc alloy-coated steel sheet, 24 gauge nominal thickness.

    a. Exterior Finish: 2-coat fluoropolymer.
    b. Color: As selected from Duranar Coatings, 2-coat system and Duranar Sunstorm Coatings, 2-coat system colors-full range.
    c. If required, insert requirements for stainless steel. Verify availability with manufacturers.

3. Panel Coverage: 8 inches.
4. Panel Height: 1.0 inch.
5. Sealant: Factory applied within interlocking joint.

2.7 ACCESSORIES

A. Reference Section 07720 Roof Accessories for additional requirements.

B. Roof Panel Accessories: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
2. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

C. Flashing and Trim: Formed from same material as roof panels, prepainted with coil coating, minimum 0.018 inch thick. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.

D. Gutters: Formed from same material roof panels. Match profile as shown on the Architectural Drawings, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match roof fascia and rake trim.

2.8 FABRICATION

A. Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to

fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal roof panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weathertight and minimize noise from movements within panel assembly.

D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. End Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. End Seams for Other Than Aluminum: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA's "Architectural Sheet Metal Manual" or by metal roof panel manufacturer for application, but not less than thickness of metal being secured.

2.9 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of the Work.

B. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.

C. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

D. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.

E. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.

B. Miscellaneous Framing: Install subpurlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written instructions.

1. Soffit Framing: Wire tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

3.3 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches . Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days.

1. Roof perimeter for a distance up from eaves of 24 inches beyond interior wall line.
2. Valleys, from lowest point to highest point, for a distance on each side of 18 inches. Overlap ends of sheets not less than 6 inches .
3. Rake edges for a distance of 18 inches.
4. Hips and ridges for a distance on each side of 12 inches.
5. Roof to wall intersections for a distance from wall of 18 inches.
6. Around penetrating elements for a distance from element of 18 inches.

B. Apply slip sheet over underlayment before installing metal roof panels.

3.4 THERMAL INSULATION INSTALLATION

A. Composite Sheathing Board Insulation: Extend insulation in thickness indicated to cover entire roof. Comply with installation requirements in Division 7 Section "Building Insulation."

B. Fasteners shall not protrude into finish side of structural and acoustical metal decking; coordinate fastener location with flute of metal decking.

3.5 METAL ROOF PANEL INSTALLATION, GENERAL

A. Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.

B. Thermal Movement. Rigidly fasten metal roof panels to structure at one and only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction. Predrill panels for fasteners.

1. Point of Fixity: Fasten each panel along a single line of fixing located at eave.
2. Avoid attaching accessories through roof panels in a manner that will inhibit thermal movement.

C. Install metal roof panels as follows:

1. Commence metal roof panel installation and install minimum of 1000 square feet in presence of factory-authorized representative.
2. Field cutting of metal panels by torch is not permitted.
3. Locate and space fastenings in uniform vertical and horizontal alignment.
4. Provide metal closures at rake edges and each side of ridge and hip caps.
5. Flash and seal metal roof panels with weather closures at eaves, rakes, and perimeter of all openings.
6. Install ridge and hip caps as metal roof panel work proceeds.
7. End Splices: Locate panel end splices over, but not attached to, structural supports. Stagger panel end splices to avoid a four-panel splice condition.
8. Install metal flashing to allow moisture to run over and off metal roof panels.

D. Fasteners:

1. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized-steel fasteners for surfaces exposed to the interior.

2. Fasteners to be fully concealed.

E. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

F. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

1. Coat back side of roof panels with bituminous coating where roof panels will contact wood, ferrous metal, or cementitious construction.

G. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.

1. Seal metal roof panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal roof panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

3.6 METAL ROOF PANEL INSTALLATION

A. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.

3.7 METAL SOFFIT PANEL INSTALLATION

A. In addition to complying with requirements in "Metal Roof Panel Installation, General" Article, install metal soffit panels to comply with requirements in this article.

B. Metal Soffit Panels: Provide metal soffit panels full width of soffits. Install panels perpendicular to support framing.

1. Flash and seal panels with weather closures where metal soffit panels meet walls and at perimeter of all openings.

C. Metal Fascia Panels: Align bottom of panels and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

3.8 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

C. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

D. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
1. Connect downspouts to underground drainage system indicated.

E. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.9 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal roof panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.10 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.

C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.11 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07411

SECTION 07421 – Metal Wall Panels

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes:
   1. Factory-formed: concealed-fastener, metal wall panels.
   2. Finish must conform to the "Metal Construction Association Certified Premium Painted™" designation. Manufacture's full range of colors.

B. Related Sections include the following:
   1. Division 5 Section "Cold Formed Metal Framing"
   2. Division 6 Section "Rough Carpentry"
   3. Division 7 Section "Sheet Metal Flashing and Trim"
   4. Division 13 Section "Metal Building Systems"

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide metal wall panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.

B. System shall meet performance criteria as installed. Either test data or signed and sealed engineering calculations shall document the performance of the panel system to meet design loads required.

C. Wind Loading: Design and size components to withstand dead and live loads caused by wind pressures as follows:
   1. Refer to the drawings for the wind loading criteria.

D. Maximum Deflection under Design Loads:
   1. 1/180 of span

E. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of wall area when tested according to ASTM E 283 at a static-air-pressure difference of 6.24lbf/sq. ft.

F. Water Penetration: No water penetration when tested according to ASTM E 331 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft.

1.5 SUBMITTALS

A. Product Data: Manufacturer's current product specifications and installation instructions.
   1. Metal wall panels
   2. Flashing and trim.
   3. Accessories
   4. Florida Product Approval Certifications for exterior building elements, if required by Authorities Having Jurisdiction

B. Shop Drawings:
   1. Include small-scale elevations, as required.
   2. Show details of trim and flashing conditions, fastening and anchorage methods, weatherproofing techniques, terminations, and penetrations.

C. Samples:
   1. Selection Samples: Submit actual metal chips with full range of colors available for Architect's selection.
   2. Verification Samples: Submit two samples of each type of metal panel required, not less than 12 inches (305mm), and illustrating finished panel profile.

D. Product Test Reports: Submit copies of test reports or load tables verifying performance capability of panel system:
   1. Metal Wall Panels: Include reports for UL 790/ASTM E 108, ASTM E 283, ASTM E 331, Field Tested, ASTM E 84 Flame Spread Rating, Paint Performance Tests.
   2. Fastener test and pull-out calculations
   3. Load tables
   4. Maintenance Data

E. Sample Warranty.

1.6 QUALITY ASSURANCE

A. Installer: Company specializing in the type of work required for this project, with not less than 2 years of documented experience.

B. Pre-Installation meeting: Convene meeting not less than one week prior to beginning installation between general contractor, installing contractor, owner's representative and manufacturer.

1.7 DELIVERY, STORAGE & HANDLING

A. Do not deliver materials of this section to project site until suitable facilities for storage and protection are available.

B. Protect materials from damage during transit and at project site. Store under cover, but sloped to provide positive drainage. Do not expose materials with strippable protective film to direct sunlight or extreme heat.

C. Do not allow storage of other materials or allow staging of other work on installed metal panel system.

D. Upon receipt of delivery of metal panel system, and prior to signing the delivery ticket, the installer is to examine each shipment for damage and for completion of the consignment.

1.8 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Fluoropolymer Finish Warranty Period: 30 years from date of Substantial Completion.

B. Special Installer's Warranty: Specified form in which Wall Installer agrees to repair or replace components of custom-fabricated sheet metal wall that fail in materials or workmanship within 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer's Qualifications: All panels are to be factory formed and packaged per job requirements.
   1. Manufacturer shall have a minimum of ten (10) years' experience in the factory fabrication of metal wall panels.
   2. Manufacturer must be certified to ISO 9001:2008 with design.

B. Basis of Design shall be ATAS International, Inc. No other manufacturer of metal wall systems shall be accepted as an alternate product without prior written approval by the Architect.

C. Coordinate with insulation requirements as noted by Architect.

D. Secondary framing members as required for load criteria and wind requirements.

2.2 CONCEALED-FASTENER, LAP-SEAM METAL WALL PANELS

A. Concealed-fastener, Lap seam Metal Wall Panels: Provide factory-formed metal wall panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation

B. Trapezoidal-Rib-Profile, Exposed-Fastener Metal Wall Panels: Formed with raised, trapezoidal ribs at 4 inches o.c. that are evenly spaced across panel width, and with rib/recess sides angled at 60 degrees or more.
   1. Basis-of Design Product: ATAS International, Inc.; Rigid Wall - MFN160
   2. Available Manufacturers:
      a. ATAS International, Inc.
      b. Or Architect-approved alternate manufactures
   3. Material: Aluminum - .040 thick
      c. Texture: Smooth
      d. Finish: KYNAR 5000® PDVF or HYLAR 5000® Finish
      e. Color: A selection from Manufacture's full range of colors to be chosen later by the Architect
   4. Panel Coverage: 16"
   5. Panel Height: 15/16"
   6. Panel Application Orientation: Horizontal.

2.3 FABRICATION

A. Panels:
   1. Panels to be Factory fabricated in a controlled environment.
   2. Panels to be tension leveled during roll forming process.
   3. Panels to be produced in longest lengths possible, except when modular units are utilized.

B. Form all components true to shape, accurate in size, square and free from distortion or defects. Cut panels to precise lengths indicated on approved shop drawings or as required by field conditions.

C. Accessories: Factory fabricates trim and flashing components in standard 12-foot lengths.
   1. Form panel lines, breaks, and angles to be sharp and true, with surfaces free from warp and buckle.
   2. Fabricate wall panels as required to maintain fabrication tolerances and to withstand design loads.

D. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

E. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

F. Panels, fabrication and installation shall meet the requirements of the Metal Construction Association Preformed Metal Wall Guidelines

PART 3 - EXECUTION

3.1 PREPARATION

A. Field Measurements
   1. Field measurements should be taken by the installer for verification of dimensional correctness in relationship to original plans, prior to providing manufacturer with a bill of material.

B. Delivery, Storage and Handling
   1. Do not deliver materials of this section to project site until suitable facilities for storage and protection are available.
   2. Protect materials from damage during transit and at project site. Store under cover, but sloped to provide positive drainage. Do not expose materials with strippable protective film to direct sunlight or extreme heat.
   3. Do not allow storage of other materials or allow staging of other work on installed metal panel system.
   4. Upon receipt of delivery of metal panel system, and prior to signing the delivery ticket, the installer is to examine each shipment or damage and for completion of the consignment.

C. Sequencing and Scheduling
   1. Installer shall coordinate with general contractor as to scheduled delivery time after receipt of field verified bill of material by manufacturer as it relates to actual project scheduling.

3.2 METAL WALL PANEL INSTALLATION, GENERAL

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
   1. Field cutting of metal wall panels by torch is not permitted.
   2. Rigidly fasten metal wall panels and allow for thermal expansion and contraction as required by the panel manufacturer. Pre-drill panels as required.
   3. Install screw fasteners.
   4. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
   5. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as necessary for waterproofing and material compatibility.
   6. Provide weatherproof seals for pipe and conduit penetrating exterior walls.

B. Fasteners: Use fasteners of size and length as required for compatibility with substrate.
   1. Aluminum Wall Panels: Use stainless-steel fasteners or metallic coated fasteners for surfaces exposed to the exterior and aluminum or galvanized steel fasteners for surfaces exposed to the interior.
   2. Concealed fasteners shall have a high performance coating
   3. Metal Protection: Where dissimilar metals will contact each other or corrosive

substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal wall panel manufacturer.

4. Coat back side of aluminum wall panels with bituminous coating where wall panels will contact wood, ferrous metal, or cementitious construction.

C. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies.

D. Provide water and air infiltration retarder / barriers as noted within project documents.

3.3 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete sheet metal roofing assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual" and NRCA Waterproofing Manual. Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
3. Panels, fabrication and installation shall meet the requirements of the Metal Construction Association Preformed Metal Wall Guidelines.

B. Coordinate with installation of:

1. Cold Formed Metal Framing, as noted in Section 5
2. Rough Carpentry, as noted in Section 6
3. Sheet Metal Flashing and Trim, as noted in Section 7

3.4 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed. Maintain in a clean condition during construction.

B. Protection:

1. Provide as required completed work of this section will be without damager or deterioration at date of substantial completion.

C. Touch up minor abrasions with matching paint provided by panel manufacturer. Remove and replace panels that cannot be satisfactorily touched up. See Metal Construction Association Technical Bulletin #95-1051.

D. Sweep and remove chips, shavings and dust from roof on a daily basis during installation period. Leave installed work clean, free from grease, finger marks and stains. Remove all protective masking from material immediately after installation of

product.

E. Upon completion of installation, remove scraps and debris from project site.

F. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt and sealant.

END OF SECTION 07421

SECTION 07464 – CEMENT SIDING

PART 1 GENERAL

1.0 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.1 SECTION INCLUDES

A. Fiber cement lap siding, trim, molding and accessories; and vapor barrier for exterior cladding.

1.2 RELATED SECTIONS

A. Section –“ Rough Carpentry”

B. Section – “Weather Barriers”

C. Section – “Exterior Painting”

1.3 REFERENCES

A. AS D3359 - Standard Test Method for Measuring Adhesion by Tape Test, Tool and Tape.

B. AS E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

1.4 SUBMITTALS

A. Submit under provisions of Section 01330– Submittal Procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Provide detailed drawings of atypical non-standard applications of cementitious siding materials which are outside the scope of the standard details and specifications provided by the manufacturer, including flashing details, windows sills & trim details.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 4 by 6 inches (100 by 150 mm), representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Minimum of 2 years experience with installation of similar products.

B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
1. Finish areas designated by Architect.

2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
3. Remodel mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store siding on edge or lay flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

A. Product Warranty: Limited, non-pro-rated product warranty.
1. Lap siding for 30 years.
2. Trim boards for 15 years.

B. Finish Warranty: Limited product warranty against manufacturing finish defects.
1. When used for its intended purpose, properly installed and maintained according to the manufacture’s published installation instructions.

C. Workmanship Warranty: Application limited warranty for 2 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: James Hardie Building Products, Inc., or Architect approved equal. James Hardie Building Products, is located at: 231 S. La Salle St. Suite 2000; Chicago, IL 60604; Toll Free Tel: 877-236-7526; Email: requestinfo(info@jameshardie.com); Web:www.jameshardiepros.com|www.jameshardie.com,

B. Requests for approval of equal substitutions will be considered in accordance with provisions of Section 01600 - Materials and Equipment

2.2 SIDING AND TRIM (Basis of Design)

A. HardiePlank HZ10 lap siding, ,
1. Fiber-cement siding - complies with ASTM C 1186 Type A Grade II.
2. Fiber-cement siding - complies with ASTM E 136 as a noncombustible material.
3. Fiber-cement siding - complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5.

B. 2X Smooth HardieTrim:
1. 2X Smooth HardieTrim manufactured by James Hardie Building Products, Inc.
2. Overall Thickness: 1-1/2 in (38 mm).
3. Width: 5-1/2 inch (140 mm).(Refer to Drawings for other sizes)
4. Width: 7-1/4 inch (184 mm).
5. Width: 9-1/4 inch (235 mm).

6. Texture: Smooth.

2.3 FASTENERS

A. Wood Framing Fasteners:
1. Wood Framing: 0.121 inch (3 mm) shank by 0.371 inch (9.4 mm) head by 1-1/4 inches (32 mm) corrosion resistant roofing nails.

B. Metal Framing:
1. Metal Framing: 1-5/8 inches (41 mm) No. 8-18 by 0.323 inch (8.2 mm) head self-drilling, corrosion resistant S-12 ribbed buglehead screws.

C. Masonry Walls:
1. Masonry Walls: Aerico Stud Nail, ET&F ASM No.-144-125, 0.14 inch (3.6 mm) shank by 0.30 inch (7.6 mm) head by 2 inches (51 mm) long corrosion resistant nails.

2.4 FINISHES

A. Factory Primer: Provide factory applied universal primer.
1. Primer: Factory primed by James Hardie.
2. Topcoat: Refer to Section 09911 - exterior finish; custom color.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If infill framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Nominal 2 inch by 4 inch (51 m by 102 mm) PT. wood framing selected for minimal shrinkage and complying with local building codes, including the use of water-resistive barriers or vapor barriers. Minimum 1-1/2 inches (38 mm) face and straight, true, of uniform dimensions and properly aligned.
1. Install water-resistive barriers and claddings to dry surfaces.
2. Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.
3. Protect siding from other trades.

D. Minimum 16-gauge (54 mm) 6” inches (92 mm) C-Stud 24 inches (610 mm) maximum on center metal framing complying with local building codes, including the use of water-resistive barriers and/or vapor barriers. Minimum 1-1/2 inches (38 mm) face and straight, true, of uniform dimensions and properly aligned.
1. Install water-resistive barriers and claddings to dry surfaces.
2. Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.
3. Protect siding from other trades.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Install a water-resistive barrier is required in accordance with local building code requirements.

D. The water-resistive barrier must be appropriately installed with penetration and junction flashing in accordance with local building code requirements.

E. Install weather barrier in accordance with local building code requirements and manufacture’s requirements

F. Seal all joints flash and lap weather barrier per manufacture’s requirements.

3.3 INSTALLATION- SIDING

A. Install materials in strict accordance with manufacturer's installation instructions.

B. Starting: Install a minimum 1/4 inch (6 mm) thick lath starter strip at the bottom course of the wall. Apply planks horizontally with minimum 1-1/4 inches (32 mm) wide laps at the top. The bottom edge of the first plank overlaps the starter strip.

C. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.

D. Align vertical joints of the planks over framing members.

E. Butt joints must not fall within 4 inches (102 mm) of a stud or furring strip. Do not nail within 2 inches (51 mm) of the end of planks.

F. Maintain clearance between siding and adjacent finished grade.

G. Locate splices at least one 24” inches away from window and door openings.

H. For proper fastener selection and fastening schedules for various wind load requirements and framing options, refer to the Technical Data Sheet per FBC-NOA.

3.4 INSTALLATION - TRIM

A. Install materials in strict accordance with manufacturer's installation instructions. Install flashing around all wall openings.

B. Fasten through trim into structural framing or code complying sheathing. Fasteners must penetrate minimum 3/4 inch (19 mm) or full thickness of furring or substrate. Additional fasteners may be required to ensure adequate security.

C. Place fasteners no closer than 3/4 inch (19 mm) and no further than 2 inches (51 mm) from side edge of trim board and no closer than 1 inch (25 mm) from end. Fasten maximum 16 inches (406 mm) on center.

D. Maintain clearance between trim and adjacent finished grade.

E. Trim inside corner with a single board trim both side of corner.

F. Outside Corner Board Attach Trim on both sides of corner with 16 gage corrosion resistant finish nail 1/2 inch (13 mm) from edge spaced 16 inches (406 mm) apart, weather cut each end spaced minimum 12 inches (305 mm) apart.

G. Allow 1/8-inch gap between trim and siding.

H. Seal gap with silicone sealant.

I. Shim frieze board as required to align with corner trim.

J. Fasten through overlapping boards. Do not nail between lap joints.

K. Overlay siding with single board of outside corner board then align second corner board to outside edge of first corner board. Do not fasten trim boards to adjacent boards; secure to the substrate.

L. Finish factory primed siding with a minimum of one coat of high-quality 100 percent acrylic or latex or oil based exterior grade paint within 180 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before final acceptance.

END OF SECTION

SECTION 07620 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Formed Products:

a. Formed low-slope roof sheet metal fabrications.
b. Formed overhead-piping safety pans.

B. Related Sections:

1. Division 6 Section "Miscellaneous Carpentry" for wood nailers, curbs, and blocking.
2. Division 7 Section "Roof Accessories" for equipment supports, vents, and other manufactured roof accessory units.

1.3 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:

1. Identification of material, thickness, weight, and finish for each item and location in Project.
2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
4. Details of termination points and assemblies, including fixed points.
5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
7. Details of special conditions.
8. Details of connections to adjoining work.
9. Detail formed flashing and trim at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Initial Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.

1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
3. Accessories and Miscellaneous Materials: Full-size Sample.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified fabricator.

B. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.9 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, dead soft, fully annealed.

1. Finish: Brushed.
2. Surface: Smooth, flat.

C. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Surface: Smooth, flat and mill phosphatized for field painting.
2. Three-Coat Flouropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
3. Color: As selected by Architect from manufacturer’s full range.
4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.2 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.
3. Products: Subject to compliance with requirements, provide one of the following:

    a. Carlisle Coatings & Waterproofing Inc.; CCW WIP 300HT.
    b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
    c. Henry Company; Blueskin PE200 HT.
    d. Metal-Fab Manufacturing, LLC; MetShield.
    e. Owens Corning; WeatherLock Metal High Temperature Underlayment.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

    a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
    b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable

for metal being fastened.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
4. Fasteners for Aluminum-Zinc Alloy-Coated Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.

C. Solder:

1. For Stainless Steel: ASTM B 32, Grade Sn60, with an acid flux of type recommended by stainless-steel sheet manufacturer.
2. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

H. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Obtain field measurements for accurate fit before shop fabrication.
3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

D. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

E. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

F. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

G. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

H. Do not use graphite pencils to mark metal surfaces.

I. Do not use segments to fabricate arches. Provide seams where indicated on Drawings.

2.5 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Base Flashing: Fabricate from the following materials:

1. Stainless Steel: 0.019 inch thick.

B. Counterflashing: Fabricate from the following materials:

1. Stainless Steel: 0.019 inch thick.

C. Flashing Receivers: Fabricate from the following materials:

1. Stainless Steel: 0.016 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. General: Install underlayment as indicated on Drawings.

B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

3.3 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
5. Torch cutting of sheet metal flashing and trim is not permitted.
6. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.

1. Coat back side of uncoated aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or

install a course of polyethylene sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

D. Fastener Sizes: Use fasteners of sizes that will penetrate metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal joints as shown and as required for watertight construction.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Do not solder metallic-coated steel and aluminum sheet.
2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
3. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

G. Rivets: Rivet joints in uncoated aluminum where indicated and where necessary for strength.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Secure in a waterproof manner by means of

snap-in installation and sealant or lead wedges and sealant or interlocking folded seam or blind rivets and sealant and anchor and washer at 36-inch centers at concealed conditions (not visible from public view.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07620

SECTION 07720 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Equipment supports.
2. Equipment pipe supports and conduit sleeves.
3. Preformed flashing sleeves.
4. Square/rectangular, elbows, and offsets gutters.
5. Precast splash blocks.
6. Gutter & rain chains.

B. Related Sections:

1. Division 5 Section "Metal Fabrications".
2. Division 7 Section “Metal Roof Panels”.

1.3 REFERENCES

A. ASTM International (ASTM):

1. ASTM A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
2. ASTM A527 - Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality.
3. ASTM A568 - Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
4. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
5. ASTM B6 - Standard Specification for Zinc.
6. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. FBC Product Approval: Roof accessories mounted to the roof shall be in compliance with the FBC product approval requirements or shall be engineered to comply with the wind speed resistance required for the project. Signed and sealed engineered drawings may be provided by a licensed engineer in the State that the project is located in, in lieu of Florida Product approval certification.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:

1. Size and location of roof accessories specified in this Section.
2. Method of attaching roof accessories to roof or building structure.
3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
4. Required clearances.

B. Warranty: Sample of special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.8 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be

supported.

1.9 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section shall be supplied by a single manufacturer with a minimum of ten years' experience.

B. Installer Qualifications: Minimum 2 years experience installing similar products.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.

B. Store products in clean, dry, sheltered area off the ground until ready for use.

1.11 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

A. Aluminum Sheet: ASTM B 209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.

1. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
2. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.

B. Aluminum Extrusions and Tubes: ASTM B 221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used, otherwise mill finished.

C. Stainless-Steel Sheet and Shapes: ASTM A 240/A 240M or ASTM A 666, Type 304.

2.2 GUTTERS & RAIN CHAINS

A. Basis of Design: Chris Industries, located at: 290 Larkin Ave.; Wheeling, IL 60090; Toll ReWeb:www.chrisind.com

B. Size as indicated on drawings.

C. Alternate manufacturers shall include:

1. Architectural Products Company

2. AMSI - Supply.

3. or Architect approved equal.

D. Requests for substitutions will be considered in accordance with provisions of the General Requirements and Specifications.

E. Gutter Materials: The finishes listed in this specification are made using materials listed below as applicable and as specified.

1. Aluminum: Kynar Painted Flat Sheet: Alloy 3105-H15. ASTM B209.

F. Size

1. Rain Chain links:

a. 316 stainless steel

2. Installation Base

a. Aluminium

G. Precast Concrete Splash Blocks:

1. Precast concrete splash block 10” wide by 24” long; reinforces Grey concrete:4000 PSI @ 28 days as manufacturer by Commercial Concrete Products, Inc. or architect approved equal, with stainless steel rain chain – epoxy set stainless steel eye bolt.

2.3 WEATHER VANE

A. Basis of Design: Weathervane Factory, located at: 1318 Main Road, Eddington, ME, 04428, Ph. No.: 1-207-843-0040, www.weathervanefacyory.com, or Architect approved equal. Model Number 131 American Eagle, with coper spacer balls, directional, rod and ring and attachment devices for roof mounting.

B. Requests for Substitutions will be considered in accordance with provisions of the

General Requirements and Specifications.

C. Weathervane Materials: Copper with factory applied patina finish. Filed applied exterior grade clear coat polyurethane coating over the entire weathervane assemble and components.

1. Size: 36 inches long, 27 inches high, and a 36-inch wingspan

2. 16-ounce copper, 24 gauge

3. Four-pronged stainless-steel mount, model number BHP046.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Glass-Fiber Board Insulation: ASTM C 726, thickness as indicated.

C. Board Insulation: ASTM C 1289, thickness as indicated, to match roof insulation.

D. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches thick.

E. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals or wood blocking, or curbs being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:

1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.

F. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

G. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

H. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 EQUIPMENT SUPPORTS

A. Equipment Supports: Internally reinforced metal equipment supports capable of supporting superimposed live and dead loads and FBC wind loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, stepped integral metal cant (as required by roof manufacturer) raised the thickness of roof insulation, and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Thaler Metal USA, Inc.
   b. Custom Solution Roof and Metal Products.
   c. LM Curbs.
   d. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
   e. Roof Products, Inc.
   f. Thybar Corporation.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported. Provide a minimum of 1’-0” clear above roof to bottom of support frame.

C. Loads: As indicated on Drawings.

D. Material: Aluminum sheet, 0.090 inch thickness as required to meet or exceed loading requirements.

1. Finish: Baked enamel or powder coat.
2. Color: As selected by Architect from manufacturer's full range.

2.6 PREFORMED FLASHING SLEEVES

A. Exhaust Vent Flashing: Double-walled metal flashing sleeve or boot, insulation filled, with integral deck flange, 12 inches high above roof surface, with removable metal hood and slotted metal collar.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. Custom Solution Roof and Metal Products.
   b. Thaler Metal USA Inc.

2. Metal: Aluminum sheet, 0.063 inch thick.
3. Diameter: As indicated on Mechanical Drawings.
4. Finish: Manufacturer's standard.

B. Vent Stack Flashing: Metal flashing sleeve, uninsulated, with integral deck flange.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Custom Solution Roof and Metal Products.
b. Thaler Metal USA Inc.

2. Metal: Aluminum sheet, 0.063 inch thick.
3. Height: 13 inches.
4. Diameter: As indicated on Mechanical Drawings.
5. Finish: Manufacturer's standard.

2.7 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.4 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Verify dimensions of roof openings for roof accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.5 INSTALLATION

A. General: Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact

surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of stainless-steel roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.

C. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.

D. Equipment Pipe Support Installation: Install pipe supports so top surfaces are in contact with and provide equally distributed support along length of supported item.

E. Preformed Flashing-Sleeve Installation: Secure flashing sleeve to roof membrane according to flashing-sleeve manufacturer's written instructions.

F. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

3.6 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.

B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Division 9 painting Sections.

C. Clean exposed surfaces according to manufacturer's written instructions.

D. Clean off excess sealants.

E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07720

SECTION 07841 - PENETRATION FIRESTOP SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.

B. Related Sections:

1. Division 7 Section "Fire-Resistive Joint Systems" for joints in or between fire-resistance-rated construction, at wall/floor intersections, and in smoke barriers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency, and UL approved assembly.

1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Engineer must be registered in the State of Florida.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written

recommendations.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A single professional firestopping installation firm for the entire Building with penetration firestopping experience on similar applications in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:

1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:

    a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
    b. Classification markings on penetration firestopping correspond to designations listed by the following:

        1) UL in its "Fire Resistance Directory."
        2) FM Global in its "Building Materials Approval Guide."

C. Pre-installation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Grace Construction Products.
2. Hilti, Inc.
3. Specified Technologies Inc.
4. 3M Fire Protection Products.

2.2 PENETRATION FIRESTOPPING

A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. Fire-resistance-rated walls include fire walls fire-barrier walls smoke-barrier walls and fire partitions.
2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. Horizontal assemblies include floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies.
2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.

3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch wg at both ambient and elevated temperatures.

E. W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.

F. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

G. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

1. Permanent forming/damming/backing materials, including the following:

a. Slag-wool-fiber or rock-wool-fiber insulation.
b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
c. Fillers for sealants.

2. Temporary forming materials.
3. Substrate primers.
4. Collars.

2.3 MIXING

A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials,water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.3 INSTALLATION

A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.

C. Install fill materials for firestopping by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Identify penetration firestopping with permanent preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping.

Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 CLEANING AND PROTECTION

A. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

3.6 PENETRATION FIRESTOPPING SCHEDULE

A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.

B. Firestopping for Metallic Pipes, Conduit, or Tubing FS-MP-1:

1. UL-Classified Systems: C-AJ- 1226.
2. F-Rating: 3 hours.
3. L-Rating at Ambient: Less than 1 cfm/sq. ft..

4. W-Rating: No leakage of water at completion of water leakage testing.

C. Firestopping for Metallic Pipes, Conduit, or Tubing FS-MP-2:

1. UL-Classified Systems: W-L-1054.
2. F-Rating: 1 and 2 hours.
3. L-Rating at Ambient: Less than 1 cfm/sq. ft..
4. W-Rating: No leakage of water at completion of water leakage testing.

D. Firestopping for Nonmetallic Pipe, Conduit, or Tubing FS-NMP-1:

1. UL-Classified Systems: C-AJ- 2109.
2. F-Rating: 2 hours and 3 hours.
3. T-Rating: 0, 2, 3 hours.
4. W-Rating: No leakage of water at completion of water leakage testing.

E. Firestopping for Nonmetallic Pipe, Conduit, or Tubing FS-NMP-2:

1. UL-Classified Systems: W-L- 2078.
2. F-Rating: 1 hour and 2 hours.
3. T-Rating: 0, 1, 2 hours.
4. W-Rating: No leakage of water at completion of water leakage testing.

F. Firestopping for Cable Trays with Electric Cables FS-CT-1:

1. UL-Classified Systems: W-J- 4009.
2. F-Rating: 2 hours.

G. Firestopping for Cable Trays with Electric Cables FS-CT-2:

1. UL-Classified Systems: W-L- 4005.
2. F-Rating: 1 and 2 hours.

H. Firestopping for Insulated Pipes FS-IMP-1:

1. UL-Classified Systems: C-AJ- 5198.
2. F-Rating: 2 hours.
3. T-Rating: 0 and ½ Hour.
4. W-Rating: No leakage of water at completion of water leakage testing.

I. Firestopping for Insulated Pipes FS-IMP-2:

1. UL-Classified Systems: C-AJ- 5301.
2. F-Rating: 2 hours.
3. T-Rating: 0 and 1½ Hours.
4. W-Rating: No leakage of water at completion of water leakage testing.

J. Firestopping for Insulated Pipes FS-IMP-3:

1. UL-Classified Systems: W-L- 5029.
2. F-Rating: 1 and 2 hours.

3. T-Rating: ½ , ¾, 1, 1 ½ and 1 ¾ hours.
4. W-Rating: No leakage of water at completion of water leakage testing.
5. L-Rating at Ambient: 4 cfm/sq ft

K. Firestopping for Insulated Pipes FS-IMP-4:

1. UL-Classified Systems: W-L- 5028.
2. F-Rating: 1 and 2 hours.
3. T-Rating: ¾, hours.
4. W-Rating: No leakage of water at completion of water leakage testing.
5. L-Rating at Ambient: less than 1 cfm/sq ft

L. Firestopping for Miscellaneous Mechanical Penetrants FS-MDC-1:

1. UL-Classified Systems: W-J- 7089.
2. F-Rating: 2 hours.
3. T-Rating: 0 hour.
4. L-Rating at Ambient: Less than 1 cfm/sq. ft.

M. Firestopping for Miscellaneous Mechanical Penetrants FS-MDC-2:

1. UL-Classified Systems: W-L- 7149.
2. F-Rating: 2 hours.
3. T-Rating: 0 hour.
4. L-Rating at Ambient: Less than 1 cfm/sq. ft..

N. Firestopping for Groupings of Penetrants FS-MLP-1:

1. UL-Classified Systems: C-AJ- 1048.
2. F-Rating: 3 hours.
3. T-Rating: 1/2 hour.
4. L-Rating at Ambient: Less than 1 cfm/sq. ft..
5. W-Rating: No leakage of water at completion of water leakage testing.

O. Firestopping for Groupings of Penetrants FS-MLP-2:

1. UL-Classified Systems: W-L- 1173.
2. F-Rating: 3 and 4 hours.
3. T-Rating: 1 hour.
4. L-Rating at Ambient: Less than 1 cfm/sq. ft..

END OF SECTION 07841

SECTION 07844 - FIRE-RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.
2. Joints in smoke barriers.

B. Related Sections:
1. Division 7 Section "Through-Penetration Firestop Systems" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: For each fire-resistive joint system. Include location and design designation of qualified testing agency.

1. Where Project conditions require modification to a qualified testing agency's illustration for a particular fire-resistive joint system condition, submit illustration, with modifications marked, approved by fire-resistive joint system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Engineer must be registered in the State of Florida.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Installer Certificates: From Installer indicating fire-resistive joint systems have been installed in compliance with requirements and manufacturer's written recommendations.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fire-resistive joint systems.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A single professional firm for the entire project with experience in installing fire-resistive joint systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its fire-resistive joint system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

B. Fire-Test-Response Characteristics: Fire-resistive joint systems shall comply with the following requirements:

1. Fire-resistive joint system tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
2. Fire-resistive joint systems are identical to those tested per testing standard referenced in "Fire-Resistive Joint Systems" Article. Provide rated systems complying with the following requirements:

a. Fire-resistive joint system products bear classification marking of qualified testing agency.
b. Fire-resistive joint systems correspond to those indicated by reference to designations listed by the following:

1) UL in its "Fire Resistance Directory."

C. Pre-installation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Install and cure fire-resistive joint systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

B. Coordinate sizing of joints to accommodate fire-resistive joint systems.

C. Notify Owner's testing agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on day preceding each series of installations.

PART 2 - PRODUCTS

2.1 FIRE-RESISTIVE JOINT SYSTEMS

A. Where required, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which fire-resistive joint systems are installed. Fire-resistive joint systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

B. Joints in or between Fire-Resistance-Rated Construction: Provide fire-resistive joint systems with ratings determined per ASTM E 1966 or UL 2079:

1. Joints include those installed in or between fire-resistance-rated walls, floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies.
2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of construction they will join.
3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hilti, Inc.
    b. Specified Technologies Inc.
    c. 3M Fire Protection Products.

C. Joints at Exterior Wall/Floor Intersections: Provide fire-resistive joint systems with rating determined by ASTM E 119 based on testing at a positive pressure differential of 0.01-inch wg or ASTM E 2307.

1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hilti, Inc.
    b. Specified Technologies Inc.
    c. 3M Fire Protection Products.
    d. Thermafiber, Inc.

D. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079.

1. L-Rating: Not exceeding 5.0 cfm/ft of joint at 0.30 inch wg at both ambient and elevated temperatures.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hilti, Inc.
    b. Specified Technologies Inc.
    c. 3M Fire Protection Products.

E. Exposed Fire-Resistive Joint Systems: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

F. VOC Content: Fire-resistive joint system sealants shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

G. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to maintain ratings required. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing agency for systems indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:

1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates.

3.3 INSTALLATION

A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
2. Apply fill materials so they contact and adhere to substrates formed by joints.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Identify fire-resistive joint systems with a permanent preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels will be visible to anyone seeking to remove or penetrate joint system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Fire-Resistive Joint System - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Where deficiencies are found or fire-resistive joint systems are damaged or removed due to testing, repair or replace fire-resistive joint systems so they comply with

requirements.

C. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

3.7 FIRE-RESISTIVE JOINT SYSTEM SCHEDULE

A. Where UL-classified systems are indicated or as required to maintain ratings, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHBN or Category XHDG.

B. Wall-to-Wall, Concrete to concrete or CMU Fire-Resistive Joint Systems FRJS-1:

1. UL-Classified Systems: WW-D- 0001.
2. Assembly Rating: 1, 2 and 3 hour.
3. Nominal Joint Width: 1 inch.
4. Movement Capabilities: Class II - 12.5 percent compression or extension.
5. L-Rating at Ambient: Less than 1 cfm/ft..

C. Wall-to-Wall, Gypsum / Concrete or CMU Fire-Resistive Joint Systems FRJS-2:

1. UL-Classified Systems: WW-S- 0052.
2. Assembly Rating: 1, 2 and 3 hour.
3. Nominal Joint Width: 1 inch.
4. L-Rating at Ambient: Less than 1 cfm/ft..

D. Floor-to-Wall, Concrete Floor to Concrete or CMU Wall; Fire-Resistive Joint Systems FRJS-3:

1. UL-Classified Systems: FW-D-0023.
2. Assembly Rating: 1 hour 2 hours.
3. Nominal Joint Width: 2 inches.
4. Movement Capabilities: Class II - 19 percent compression or extension.
5. L-Rating at Ambient: Less than 1 cfm/ft..

E. Head-of-Wall, CMU or Concrete Partitions; Fire-Resistive Joint Systems FRJS-HWD-

CMU:

1. UL-Classified Systems: HW-D-1034.
2. Assembly Rating: 1 hour to 3 hour.

F. Head-of-Wall, gypsum Partitions; Fire-Resistive Joint Systems FRJS-HWD-GWB:

1. UL-Classified Systems: HW-D-0043.
2. Assembly Rating: 1 hour to 2 hour.

G. Perimeter Fire-Resistive Joint Systems PFRJS-1:

1. UL-Classified Perimeter Fire-Containment Systems: CW- S-2034.
2. Integrity Rating: 1 ½ to 2 hours.
3. Insulation Rating: 1/4 hour.
4. Linear Opening Width: 8 inches, maximum.
5. L-Rating at Ambient Temperature: Less than 1 cfm/ft..

H. Perimeter Fire-Resistive Joint Systems PFRJS-2:

1. UL-Classified Perimeter Fire-Containment Systems: CW- S-20349.
2. Integrity Rating: 1 ½ to 2 hours.
3. Insulation Rating: 1/4 hour.
4. Linear Opening Width: 8 inches, maximum.
5. L-Rating at Ambient Temperature: Less than 1 cfm/ft..

I. Perimeter Fire-Resistive Joint Systems PFRJS-3:

1. UL-Classified Perimeter Fire-Containment Systems: CW- S-2044.
2. Integrity Rating: 1 ½ to 2 hours.
3. Insulation Rating: 1/4 hour.
4. Linear Opening Width: 8 inches, maximum.
5. L-Rating at Ambient Temperature: Less than 1 cfm/ft..

END OF SECTION 07844

SECTION 07900 - CAULKING AND SEALANTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Furnish all labor, materials, tools, equipment, etc. and services necessary and incidental to the complete fabrication, furnishing and erection of this Section as noted, detailed, necessary, and reasonably implied on the drawings and in the specifications.

1.3 RELATED SECTIONS

A. Coordinate work of this Section with work of other Sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other Sections, including:

1. Section 07210 – Sound Reduction Sealants.

2. Section 07841 – Penetration Firestop Systems.

3. Section 08905 – Window Walls and Exterior Glazing.

4. Divisions 15 and 16, Mechanical, Plumbing, Fire Protection, Electrical.

1.4 DEFINITIONS

A. "Caulking Compound" shall apply only to materials and work in connection with the filling or closing of interior joints where expansion or contraction are of no consideration, and where filling and closing of these interior joints are primarily for appearance.

B. "Sealant" shall apply to materials and work to seal and make watertight all joints on the exterior of the building and joints on the interior of the building that may be expected to expand and contract.

C. "Silicone" shall apply to glazing systems including perimeter, butt joint, structural, storefront, and metal curtainwall.

D. “Mildew Resistant Sealant” shall apply to sealant to be applied to all interior tiled joints or other non-porous substrates that are subject to in-service exposures of high humidity and temperature extremes.

1.5 SUBMITTALS

A. Submit product data under provisions of Section 01300 – Shop Drawings,

Product Data, and Samples.

B. Complete data sheets clearly identifying all materials, specifications and locations where they are proposed for use in this project.

C. Manufacturer's printed data, specifications, and installation procedures.

D. Manufacturer’s compatibility statement that sealant bonding surfaces and materials are acceptable surfaces for proposed sealant and surface preparation requirements, including priming and cleaning criteria.

E. Manufacturer’s field pull test for existing adhesion, stain and primer requirements for each sealant application and sealant surface. Pull test shall be conducted in accordance with ASTM standards.

1.6 WARRANTY

A. Refer to Section 01700 - Project Closeout, Detail Requirements. Provide a warranty covering sealant materials and joint failure.

B. Joint failure is defined as:

1. Leaks of air or water.

2. Evidence of loss of cohesion - cohesive failure.

3. Fading of sealant material beyond manufacturer's standard printed Criteria.

4. Migration of sealant.

5. Evidence of loss of adhesion between sealant and joint edge - adhesive failure.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Section 01600 – Materials and Equipment and Section 01620 – Storage and Protection.

B. Deliver materials in their original unbroken containers, bearing the manufacturer's name and brand designation and specification number where applicable. Caulking compound, sealant, or components more than 6 months old shall not be used.

1.8 SCOPE

A. The work includes caulking and sealing all portions of new construction.

B. Specific materials and areas to be caulked or sealed include, but are not limited to, the following:

1. Door and window opening frames at interior and exterior of building

2. Door thresholds at exterior of building

3. Intersection of dissimilar materials at interior and exterior floors, walls, stairs, and ceilings of the buildings

4. Intersection or termination of specialty materials such as granite countertops, marble, tile, etc.

5. Stucco joints and accessories

6. Sheet metal work other than flashings

7. Joint conditions as directed by the Architect

PART 2 – PRODUCTS

2.1 CAULKING

A. Interior, air-conditioned areas, caulking compound shall be acrylic latex type, ASTM C834. Provide one of the following:

1. GE – RCS20

2. Sonneborn “Sonolac.”

3. Pecora “AC-20.”

4. Bostik “Chem-Calk 600/650.”

5. Tremco “Tremflex 834.”

2.2 ELASTOMERIC SEALANTS

A. Provide single-component or multi-component, low-modulus, non-sag polyurethane sealant that is suitable for continuous immersion in water; comply with ASTM C920, Type S or M, Grade NS, Class 25.

1. Acceptable Sealants:

a. Tremco “Vulkem 116/921/922.”

b Tremco, “Dymeric 511.”

c. Bostik “Chem Caulk 900.”

d. Pecora “Dynatrol 1.”

e. Sika “Sikaflex 1A,” Sikaflex 2cNS", or "Sikaflex 15LM

B. Provide single-component or multi-component polyurethane sealant having a Shore A hardness of not less than 25, or more than 50, and plus-or-minus 25 percent joint movement capability that is suitable for continuous immersion in water; comply with ASTM C920, Type S or M, Grade P or NS, Class 25.

1. Acceptable Sealants:

   a. Tremco “Vulkem 45/245/227.”

   b. Tremco “THC 900/901.”

   c. “Sikaflex-1a" or "Sikaflex-2c NS/SL"

C. Sealant shall meet ASTM C 920 for one part and two-part polysulfide base sealants.

1. Pecora “GC-9 Synthacalk,” one part.

2. Pecora “GC-5 Synthacalk,” two part.

3. Sonneborn “Sonolastic Sealant,” one part or two part.

   a. Color of sealants as selected by Architect from manufacturer's standard colors.

2.3 MILDEW RESISTANT SEALANT (INTERIOR WET AND TILED AREAS)

A. One-Part, Mildew-Resistant Silicone Sealant: ASMT C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and temperature extremes.

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.

C. Products: Subject to compliance with requirements, provide one of the following products:

1. Dow Corning “Dow Corning 786.”

2. GE Silicones “Sanitary 1700.”

3. Pecora “Pecora 898 Sanitary Silicone Sealant.”

2.4 SILICONE

A. Silicone sealants shall meet ASTM C 920.

B. Silicone shall be as manufactured by G.E., or Dow Corning, or Sika as recommended by the manufacturer as appropriate for the intended use.

C. Color as selected by the Architect.

2.5 PENETRATION SEALANT/FIRE RATED SEALANT SYSTEMS

A. See Section 07840 – Firestopping (Penetration Seals).

2.6 BOND BREAKERS

A. Bond breakers where required by sealant manufacturer.

2.7 PRIMER

A. Primers for joint groove shall be primers recommended by the caulking or sealant manufacturer as being required to seal the pores in the materials, the sides of the joint grooves, and as being compatible with the caulking or sealant being used.

2.8 BACKER MATERIAL

A. Backing material shall be a closed cell non-staining polyethylene in round or square shape as recommended by the manufacturer of the compound. Materials shall be free from oil or other staining elements. Oakum and other types of absorptive or open cell materials shall not be used.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

A. All items in this Section shall be installed by experienced skilled mechanics in the best workmanlike manner of the trade's best standard practice and in strict accordance with approved submittals.

3.2 JOINT DIMENSIONS

A. Depth of joint is defined as distance from outside face of joint to closest point of joint filler, whether joint filler is rod shaped or rectangular shaped.

B. Joints: Depth and width as required and confirmed by product manufacturer but no less than the following requirements.

1. Joints: Never less than 1/8 inch depth by 1/4 inch width, unless specifically approved by Architect.

2. For joints in concrete or masonry, depth of sealant must be 1/2 of the width of joint up to 1/2 inch wide. For expansion, other joints exceeding 1/2 inch in width, depth of sealant: no greater than 1/2 sealant width.

3. For joints in non-porous surfaces, metal, glass, sealant depth: minimum of 1/2 sealant width, in no case exceeding sealant width.

4. Contractor shall determine/verify that joint dimension limits noted above and required by the joint sealant manufacturer are met.

3.3 JOINT INSPECTION

A. Building joints shall be examined prior to application and any conditions detrimental to achieving a positive, weather-tight seal shall be reported to the General Contractor and the Architect.

B. All openings, joints, or channels to be sealed shall be thoroughly clean, dry, and free from dust, oil, grease, loose mortar, or any other foreign matter.

C. Surfaces with protective coatings that the sealant will come in contact with such as new aluminum or bronze, shall be wiped with approved solvent, and wiped dry with a clean cloth; to remove any protective coating not tightly adhered and any oil deposit that may be left on the metal surfaces.

D. All joints shall have a closed-cell polyethylene joint backing, which shall be packed into the joint within 1/2 inch of the surface.

E. Concrete shall be fully cured, free of release agents, curing compounds, loose aggregate and other surface treatments. Treated surfaces shall be tested for adhesion before proceeding with sealant work.

F. Joint spaces and surfaces: Thoroughly dry before installation of sealant materials. Do not install sealant materials when temperature is below 40 degrees F, or during or after rain or fog.

3.4 INSTALLATION

A. The mixing and application of all caulking/sealant compounds shall be in strict accordance with the manufacturer's instructions.

B. All joints where caulking compounds are to be applied in excess of 1/2 inch in depth shall be packed with a polyethylene foam rod stack filler material to within 1/2 inch from the face to surface. The caulking width and depth in relation to joint movement shall be a maximum of 25 percent compression and 25 percent extension.

C. Bond breaker strips shall be used where sufficient room for backer rods does not exist or as required by manufacturer.

D. Primer shall be used as it comes from can, unaltered. Prime joints before insertion of joint filler materials, per caulking/sealant manufacturer's directions.

E. Seal the heads, sills, and jambs of all windows and the heads and jambs of doorframes where they abut walls.

F. Sealant shall be applied with full gun pressure forcing the caulking well back into joint. Build the sealant out to a 45-degree angle in all corners, finish the sealant bead by tooling at the doorframes in masonry walls.

G. Wipe all excess compound and leave in proper condition for painting. Use only a paintable sealant material.

H. Exterior thresholds shall be set in a full bed of exterior-type sealant compound.

I. Fill joint with filler material so that depth and width of joint have relationships as noted herein before under "Joint Dimensions".

J. Sealant materials shall be applied within the "application life" recommended by

manufacturer for prevailing temperature and humidity conditions.

K. Protect exposed surfaces adjacent to joints to prevent permanent staining or other damage to adjacent work.

1. All joints shall be tooled into place to give concave shaped surfaces.

L. Wood shall be clean, dry and primed with a primer as recommended by the manufacturer of compound to be used.

M. Metal and glass shall be dry, free of oil, grease and dirt. Immediately before sealing with compounds, wipe surfaces to be filled with clean rags soaked in either methylethyl ketone, high flash naptha, lacquer solvents, or 50-50 alcohol and water, as appropriate, and wiped dry with a clean cloth.

N. Seal all interior wood trim and metal surfaces which bear or abut on masonry surfaces and all corners where wood and metal adjoins masonry surfaces. Seal all joints between concrete and masonry surfaces. Masonry joints shall be dry, wire brushed, free of dirt, grease or oil and primed with a primer, recommended by the manufacturer of compound to be used.

O. If primer used will produce yellowing, discoloration, or dirt pickup when applied on substrates, surfaces adjacent to joint shall be protected from such contamination by use of masking. Care shall be taken to remove masking tape before permanent adhesion takes place.

P. All exterior wall mounted fixtures shall be caulked at top and both sides of the fixture or mounting plate. All conduits that penetrate exterior wall shall be sealed and junction boxes shall be sealed at the perimeter of the box prior to setting fixture.

3.5 CLEANING

A. The surfaces of all materials adjacent to caulking and sealing operations shall be cleaned of any smears of compound or other soiling due to the caulking and sealing application. Fresh compound that has been smeared on adjacent surfaces shall be removed immediately and rubbed clean with non-staining solvent.

3.6 MATERIALS AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and replaced with new material in the best workmanlike manner at no extra cost to the Owner.

END OF SECTION 07900

SECTION 08100 - METAL DOORS AND FRAMES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Furnish all labor, materials, tools, equipment, etc. and services necessary and incidental to the complete fabrication, furnishing and erection of this Section as shown, noted, detailed and reasonably implied on the drawings and in the specifications.

1.3 RELATED SECTIONS

A. Coordinate work of this Section with work of other Sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other Sections, including:

1. Section 04810 – “Unit Masonry Assemblies.”
2. Section 07900 – “Joint Sealers.”
3. Section 08710 – “Door Hardware.”
4. Section 09911 – “Exterior Painting.”
5. Section 09912 – “Interior Painting.”

1.4 SHOP DRAWINGS AND SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300 – Shop Drawings, Product Data and Samples.

B. Provide a schedule of doors and frames using same reference numbers for openings and details as those on Contract Document. Indicate coordination of glazing frames and stops with glass and glazing requirements.

C. Show dimensioned door and frame elevations, locations, jamb conditions, methods of assembling, hardware preparation, label compliance, sound ratings, finishes, and anchorage details.

D. Submit manufacturer's printed literature on all doors frames, louvers and transoms including State of Florida-NOA product approval data sheets, demonstrating performance for all wind load conditions and pressures, outlined per the Structural Drawings. Product Data: For each type of sliding automatic entrance door indicated.

E. Submit test reports per Article 1.7, this Section.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Section 01600 – Materials and Equipment and Section 01620 – Storage and Protection.

B. Doors and frames shall be stored per manufacturer's instructions.

C. All doors shall be individually packaged in cartons completely covering entire door to prevent damage or marring of the finish.

D. Store doors and frames at building site under cover. Place units on minimum 4 inch high wood blocking. Avoid use of non-vented plastic or canvas coverings which could create humidity chamber. Provide ¼ inch spaces between staked doors to promote air circulation.

1.6 WARRANTY

A. Hollow metal doors shall be warranted by the manufacturer for a period of one (1) year against delamination, a lifetime warranty on rust perforation, and a one (1) year warranty from defects in materials and workmanship starting from date of substantial completion. See Section 01770 - Closeout Procedures, Detail Requirements.

1.7 TEST REPORTS AND COMPLIANCE

A. Flush Face Exterior Doors:

1. Acoustical qualities of 1-3/4 inch Doors shall be a minimum sound transmission classification of 26 as tested under ASTM E90. The urethane foam core shall have a "U" factor of 0.067 and "R" factor 14.8

2. Shall meet ANSI A151.1 performance test acceptance criteria for physical endurance; Level "A' (Class A) one million cycles; S.D.I. 100 classification Grade 2, Heavy Duty; Model 4.

B. Underwriter's Laboratories, Factory Mutual and Warnock Hersey labeled fire doors and frames:

1. ALL labeled fire doors and frames shall be of a type which has been investigated and tested in accordance with UL 10(b), ASTM E152, NFPA 252, ANSI A2.2 and, when required, UL 305.

2. A physical label shall be affixed to the fire door and fire door frame at an authorized facility as evidence of compliance with procedures of the labeling agency.

3. Labeled doors shown on the drawings shall meet the requirements of Underwriter's Laboratories, Inc., for Class of construction and shall bear their approval label, as one of the following.

a. 3 hour.

b. 1-1/2 hour.

c. 1 hour.

d. 3/4 hour.

e. 20 minute.

C. EXTERIOR OPENINGS: Exterior doors shall comply with wind load criteria specified per the latest version of the FBC. Door material gauges and reinforcement criteria specified here are minimum criteria. Door assemblies shall resist the cyclic pressures, static pressures and missile impact loads as detailed in Florida Building Code test protocols TAS 201, TAS 202, and TAS 203. Subject to compliance with requirements, and complete assembly testing for the Florida Building Code wind load requirements, manufacturers not listed below, offering products that may be incorporated into the work, are subject to the Architect's approval prior to award of the contract.

PART 2 – PRODUCTS

2.1 METAL DOORS (HM-1)

A. General: Refer to Door Schedule on the Drawings for door profiles.

B. Metal doors, Type "A" or Class I heavy duty, flush face as manufactured by Baron Metal Industries Inc. Equivalent products manufactured by CECO Corp., Curries, S.W. Fleming Ltd., Steelcraft Manufacturing, Republic Builders Products, Mesker Door, Inc., or Daybar are acceptable.

2.2 CONSTRUCTION

A. Exterior flush face doors shall be of composite construction, fabricated of two (2) level 2, heavy duty, 18 gauge seamless steel sheets from roller leveled prime quality cold-rolled steel for interior areas and roller leveled prime quality hot dipped galvanized or A60 galvannealed steel sheets for exterior areas. Interior doors to be 20 gauge, A60 galvannealed with mechanically interlocking seams on door edges only. Gauge of steel sheets may be required to be 16 gauge at exterior doors to resist higher wind pressures and dependent on door manufacturer’s standards and the structural capacity of the door dipped galvanized or A60 galvannealed steel sheets for exterior areas, with fully welded seams. Interior doors to be 20 gauge, A60 galvannealed with mechanically interlocking seams on door edges only.

B. Doors shall be accurately mortised, reinforced, drilled and tapped for finish hardware. Reinforcement plates for hardware shall be welded to door assembly and be of sufficient size to develop the door strength.

C. Top and bottom of the doors shall be closed flush by 16 gauge steel channels unless recessed automatic door bottoms are required. See Section 08710 – Finish Hardware.

D. Minimum gauges for hardware reinforcing plates shall be as follows:

1. Hinges and pivots - 7 gauge W.C.G. steel, prepared for 1 1/2 pairs of standard weight 4" hinges.

2. Lock face, flush bolts, concealed holders, concealed or surface-mounted closers - 12 gauge.

3. All other surface-mounted hardware - 16 gauge.

4. Hardware templates will be furnished by hardware supplier (Refer to Section 08710 – Finish Hardware).

E. After all welds and joints are ground smooth, the doors shall be thoroughly cleaned, given a coat of baked-on primer, all irregularities filled and made flush and then given a final coat of baked-on primer, interior doors 0.7 mils DFT and exterior doors 1.4 mils DFT. Exterior means doors exposed to outside air atmosphere, or non-conditioned spaces.

F. Core insulation:

1. Exterior doors shall have rigid urethane or polystyrene core foamed-in-place, or honey combed core, chemically bonded to all interior surfaces of face sheets; core shall be provided per door manufacture’s requirements to comply with the FBC windload requirements and thermal (“R” value) requirements at doors that are contigous to conditioned spaces, as shown on the Drawings or specified, or scheduled.

2. Interior doors shall have pre-expanded honeycomb core bonded to all interior surfaces of face.

G. Exterior Doors: Provide weatherstripping (3 sides). In addition, these doors shall include a threshold with recessed channel to receive automatic door bottom when scheduled. Refer to Section 08710 – Finish Hardware.

1. Maximum air infiltration shall be 1.25 cfm per square foot of door area.

2. Frames shall be prepared to accommodate automatic door bottoms when this hardware is scheduled or required.

2.3 DOORS SWINGING IN PAIRS

A. Doors shall have two-piece overlapping astragals which consist of an 18 gauge steel edge channel applied to inactive leaf and applied to the active leaf an extruded aluminum overlap strip with wool pile insert. All metal parts painted to match the doors.

B. Pair of labeled fire doors shall have two-piece overlapping astragals consisting of 16 gauge steel edge channel applied to inactive door and 12 gauge steel overlap strip applied to active leaf in accordance with procedures of labeling agencies.

C. Refer to Finish Hardware Schedule, Section 08710 – Finish Hardware, for meeting stiles and additional astragals.

2.4 METAL FRAMES

A. Metal frames shall be of the combination type with the trim and stops formed as an integral part of the frame. Profiles shall be press brake-formed true and sharp with head and jambs accurately mitered, continuously welded and ground smooth (welding type T-3). Frames shall have proper concealed anchors as required for each wall material.

B. Frames shall be 16 gauge hot-dipped galvanized steel with following anchors as required: Note that metal frames coated with S. W. Fleming Ltd.'s "paintable Galvanneal coating" satisfies the hot-dipped galvanized requirement.

1. Each jamb installed adjacent to masonry shall have one 16 gauge hot-dipped galvanized steel "T" anchor for each 24 inches of the jamb height, 3 min. per jamb.

2. Each jamb installed in existing concrete walls shall use expansion anchors, minimum of 3 per jamb.

3. Each jamb installed in drywall openings shall have a minimum of 3 adjustable drywall stud anchors per jamb.

4. Welded "Z" clips per manufacturers recommendations for specific installation requirements.

5. All door jambs shall rest on building floor slab construction and shall have 12 gauge floor angles welded to jambs for floor anchorage.

6. All door frame assemblies shall have removable steel spreaders welded to the bottom of the jambs to assure alignment.

C. Frames shall be accurately mortised, reinforced, drilled and tapped for finish hardware. Reinforcing for hardware shall be welded at the frame assembly. Closure bracket reinforcement, plaster guards, hinge reinforcements and reinforcement for all other surface applied hardware to be manufacturer's standard. Dust covers shall be welded over all punched openings and reinforcements to prevent clogging of tapped holes or openings.

D. After all welds and joints are ground smooth, the doors shall be thoroughly cleaned, given a coat of baked-on primer, all irregularities filled and made flush and then given a final coat of baked-on primer, interior doors 0.7 mils DFT and exterior doors 1.4 mils DFT. Exterior means doors exposed to exterior elements, including but not limited to salt air atmosphere.

E. Punch lock side of stop for single doors at 3 points and at 2 points on stop at head section of pairs of doors to receive door silencers.

F. Frames for labeled doors shall meet the requirements of Underwriters Laboratories, Inc., for Class of construction as indicated on schedule, and bear their approved label. See Article 1.7, Test Reports and Compliance.

G. After fabrication is completed, the frames shall be thoroughly cleaned,

bonderized and given a coat of baked on primer, interior frames 0.7 mils DFT and exterior frames 1.4 mils DFT.

H. KNOCK-DOWN TYPE FRAMES SHALL NOT BE PERMITTED!

I. Prepare frames to receive hardware as specified in Section 08710 – Finish Hardware.

2.5 LOUVERS AND FRAMES

A. Door louvers, where scheduled or shown shall be of the fixed slat type providing a minimum of 50% net free area. Louver blades shall be formed of 18 gauge steel and set in 16 gauge frames. Louvers for exterior openings shall have insect screens set in removable frames, mounted to the inside face of louver.

B. Panels above doors shall be of the same construction as door below panel.

2.6 PAINTING

A. Painting of hollow metal doors and frames shall comply with the following:

1. Door and Frame Schedules.

2. Section 09911 – Exterior Painting.

3. Section 09912 – Interior Painting.

4. Field apply bituminous paint to first 18 inches above finish floor of all exterior hollow metal door frames at interior/concealed surfaces of the door frame.

B. Colors of doors and frames shall be approved and selected by the Architect and Owner.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

A. All work shall be shop fabricated by experienced, qualified mechanics of this trade, to required profiles by forming and welding with corners, angles and edges straight and sharp.

B. Fit and fabricate accurately with corners, joints, seams and surfaces free from warp, wave buckle or other defects.

3.2 INSTALLATION

A. All metal doors and frame shall be installed true, level and plumb and in the best workmanlike manner of this trade. After wall construction is complete, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

B. All door hardware shall be installed in strict accordance with the manufacturer's printed instructions and free of all defects.

C. At masonry walls, frames shall be braced until wall in which frame is installed is complete.

D. Frames to be installed in masonry walls shall be set prior to starting masonry work. Anchors shall be installed in jambs and in masonry joints, the area between the masonry and jamb shall be filled solid with mortar. Frame installation shall comply with provisions of SDI-105 “Recommended Erection Instructions For Steel Frames”, and as specified herein.

E. Templates for all hardware items shall be coordinated with hardware suppliers.

F. Install fire rated frames according to NFPA 80 and fire rated doors with clearances specified in NFPA 80. Fit doors accurately in frames, within clearances specified in ANSI/SDI-100.

G. Provide a minimum of three anchors per jamb, adjacent to the hinge location on the hinge jamb, and at corresponding heights on strike jamb.

H. Prime coat touch up immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up coating of compatible air drying primer.

3.3 MATERIAL AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and be replaced with new material in the best workmanlike manner at no extra cost to the Owner.

B. Check and re-adjust operating hardware items, leaving steel doors and frames undamaged and in complete and proper operating condition.

END OF SECTION 08100

SECTION 08212 - STILE AND RAIL DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Interior stile and rail doors.
2. Interior fire-rated, stile and rail doors.
3. Finishing stile and rail doors.
4. Fitting stile and rail doors to frames and machining for hardware.

B. Related Sections:
1. Division 6 Section "Interior Architectural Woodwork" for requirements for veneers from the same flitches for both architectural woodwork and stile and rail wood doors.
2. Division 8 Section “Interior Glazing“ for glass doors.

1.3 REFERENCES

A. ASTM D-1037 –91 American Society for Testing and Materials: Standard Methods for Evaluating the Properties of Wood-Based Fiber and Particle Board Panel Materials.

B. ANSI A208.1 – Urea-formaldehyde Emissions.

C. ASTM E 152-81a – Standard Methods of Fire Tests of Door Assemblies.

D. WDMA I.S.6-A-99 - Window and Door Manufacturers Association.

E. Architectural Woodwork Standards, latest edition, published jointly by the Architectural Woodwork Institute, the Architectural Woodwork Manufacturer Association of Canada, and the Woodwork Institute.

F. NFPA 80 – Fire Doors and Windows.

G. FPA 252 – Standard Methods of Fire Tests for fire Door Assemblies.

H. FBC. – Latest edition adopted by authority having jurisdiction.

I. Fire Tests of Door Assemblies as enforced by the local Authority Having Jurisdiction (AHJ).

J. ITS – Certification Listings for Fire Doors.

K. Both FBC and National ADA.Codes – latest edition.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1. Include details of construction and glazing.
2. Include factory finishing specifications.

B. Shop Drawings: For stile and rail wood doors. Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data, including those for stiles, rails, panels, and moldings (sticking); and other pertinent data, including the following:

1. Dimensions of doors for factory fitting.
2. Locations and dimensions of mortises and holes for hardware.
3. Requirements for veneer matching.
4. Doors to be factory finished, and finish requirements.
5. Details of sound-control seals, door bottoms, and thresholds (where sound rated doors are indicated on Drawings or scheduled).
6. Fire ratings for fire-rated doors.

a. Neutral Pressure – UL10-B or,
b. Positive Pressure – UL10-C.

C. Samples for Initial Selection: For factory-finished doors.

D. Samples for Verification: Corner sections of doors, approximately 12 by 12 inches, with door faces and edgings representing typical range of color and grain for each species of veneer and solid lumber required. Finish Sample, approximately 6 by 6 inches with same materials proposed for factory-finished doors.

E. Schedule: Provide a schedule of sound-control door assemblies prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with the Door Hardware Schedule.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified acoustical testing agency.

B. Product Certificates: For each type of door, from manufacturer.

C. Warranty: Sample of special warranty.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Acoustical Testing Agency Qualifications: An independent agency accredited as an acoustical laboratory according to the National Voluntary Laboratory Accreditation Program of NIST.

C. Source Limitations: Obtain stile and rail doors from single manufacturer. Paint grade and stain grade doors to have matching architectural details, profiles, and dimensions.

D. Source Limitations: Provide custom stile and rail wood doors scheduled to be stained to match the Architect’s sample and finished in same shop as work in Division 6 Section 06202 Interior Finish Carpentry.

E. Sound Rating: Provide sound-control door assemblies identical to those of assemblies tested as sound-retardant units by an acoustical testing agency, and have the following minimum rating:
   1. See the Sound-Control Door Assemblies Table at the end of the Evaluations for a list of manufacturers' products according to door material (steel or wood) and STC rating. Higher ratings may require doors that are thicker than 1-3/4 inches (44 mm). Verify with manufacturer.
   2. STC Rating: Rating of 34 as determined by ASTM E 413 when tested in an operable condition according to ASTM E 90 and ASTM E 1408.

F. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL 10B.

   1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 250 deg F above ambient after 30 minutes of standard fire-test exposure.

G. Safety Glass: Provide products complying with testing requirements in 16 CFR 1201, for Category II materials, unless those of Category I are expressly indicated and permitted.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's written instructions and requirements of quality standard referenced in Part 2.

B. Doors & frames shall be stored on a flat and level surface in a well ventilated dry building. Doors shall not be stored on edge and shall be protected from dirt, water and abuse.

C. Package doors individually in opaque plastic bags or cardboard cartons.

D. Protect doors & frames from exposure to light for veneers which are light sensitive.

E. Doors & frames shall not be subjected to extreme heat or humidity. HVAC systems should be set to provide a temperature range of 60 – 90 degrees F and 25-55% relative humidity.

F. Handle doors and frames with clean hands or gloves. Do not drag doors across floors or other surfaces.

G. Mark each door and frame on top and bottom edge with opening number used on Shop Drawings.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and permanent or temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period in accordance with mfg. requirements.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship, or have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
2. Warranty shall be in effect during the following period of time from date of Substantial Completion:
   a. Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Use only materials that comply with referenced standards and other requirements specified.

1. Assemble interior doors, frames, and sidelites (where scheduled), including components, with either dry-use or wet-use adhesives complying with ASTM D 5572 for finger joints and with ASTM D 5751 for joints other than finger joints.

B. Certified Wood: Fabricate doors with all wood products produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

C. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea-formaldehyde resins.

D. Low-Emitting Materials: Fabricate doors with coatings, adhesives and composite wood products that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Panel Products: Any of the following:

1. Medium-density fiberboard made from wood fiber, with binder containing no urea-formaldehyde resin, complying with ANSI A208.2, Grade 130. Panels shall be compressed to a density of 48 pounds per cubic foot in a hot press by a process in which the added binder creates the entire inter-fiber bond.
2. Hardboard, complying with AHA A135.4.
3. Veneer core plywood, made with adhesive containing no urea-formaldehyde resin.

2.2 INTERIOR STILE AND RAIL DOORS

A. Interior Stile and Rail MDF Doors (Painted): Stock interior doors complying with AWI's "Architectural Woodwork Quality Standards,"AWI's "Manual of Millwork," WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors," and with other requirements specified.

1. Basis-of-Design Product: Subject to compliance with requirements, provide TruStile Doors, LLC; TS3300 & TS1000 (Glass Panel) MDF Doors or comparable product by one of the following:

   a. Harring Doors.
   b. Ideal Architectural Doors & Plywood.
   c. Maiman Company (The).
   d. Marshfield Door Systems, Inc.

2. Panel Designs: Indicated by Drawings. Do not modify intended aesthetic effects, as judged solely by Architect and Owner, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
3. Grade: Custom.
4. Finish: Factory Primed with low VOC, water based primer.
5. Louver Type: Where indicated on Drawings, vented with inverted “V” type louver blades.

6. Door Construction:

a. Stile and Rail Construction: Medium-density fiberboard core material with manufacturer's standard hardwood edge system for improved screw holding to extend the entire height of door.
b. Panel Construction: Shaped, medium-density fiberboard.

1) Panel Type: As selected by Architect and Owner from manufacturer's full range.

7. Stile and Rail Widths: Manufacturer's standard, but not less than the following:

a. Stiles, Top and Intermediate Rails: 4-1/2 inches.
b. Bottom Rails: 10 inches.

8. Raised-Panel Thickness: Manufacturer's standard, but not less than thickness required to comply with specified standards.
9. Flat-Panel Thickness: Manufacturer's standard, but not less than thickness required to comply with specified standards.
10. Molding Profile (Sticking): Recessed square or as selected by Architect and Owner from manufacturer's full range.
11. Glass: Uncoated, clear, fully tempered float glass, 5.0 mm thick, complying with Division 8 Section "Interior Glazing."

B. Interior Stile and Rail Veneer Doors (Stained): Stock interior doors complying with AWI's "Architectural Woodwork Quality Standards,"AWI's "Manual of Millwork," WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors," and with other requirements specified. Refer to door schedule for stained doors.

1. Basis-of-Design Product: Subject to compliance with requirements, provide TruStile Doors, LLC; TS3300 & TS1000 (Glass Panel) Doors or comparable product by one of the following:

a. Harring Doors.
b. Ideal Architectural Doors & Plywood.
c. Maiman Company (The).
d. Marshfield DoorSystems, Inc.
e. Woodharbor.

2. Panel Designs: Indicated by Drawings. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's and Owner's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
3. Grade: Custom.
4. Finish: Transparent or Opaque as scheduled, to match Architect's sample.
5. Louver Type: Where indicated on Drawings, vented with inverted "V" type louver blades.
6. Wood Species and Cut for Transparent Finish: "A" grade plain sliced White Oak – Color to match Architect's control sample; Grey Mist
7. Door Construction:

a. Stile and Rail Construction: Core material to be constructed of engineered wood to resist moisture, warping, checking and improved screw pull. Stiles are to be constructed for improved screw holding by use of solid wood edges. Hardwood stiles to match face veneers.
b. Panel Construction: Medium-density fiberboard core with solid wood panels laminated both sides or solid wood to match profile specified.

1) Panel Type: As selected by Architect and Owner from manufacturer’s full range.

8. Stile and Rail Widths: Manufacturer's standard, but not less than the following:

a. Stiles, Top and Intermediate Rails: 4-1/2 inches.
b. Bottom Rails: 10 inches.

9. Raised-Panel Thickness: Manufacturer's standard, but not less than thickness required to comply with specified standards.
10. Flat-Panel Thickness: Manufacturer's standard, but not less than thickness required to comply with specified standards.
11. Molding Profile (Sticking): Recessed square or as selected by Architect from manufacturer's full range.
12. Glass: Uncoated, clear, fully tempered float glass, 5.0 mm thick, complying with Division 8 Section "Interior Glazing."
13. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
14. Provide WI-Certified Compliance Certificate indicating that doors comply with requirements of grades specified.
15. Mark, label, or otherwise identify stile and rail wood doors as complying with WDMA I.S.6A and grade specified.
16. Provide match wood astrgals at pairs of wood doors, to match the door vendor.

C. Interior Stile and Rail Fire-RatedDoors: Fire-rated (20 -minute rating as scheduled) doors complying with AWI's "Architectural Woodwork Quality Standards," AWI's "Manual of Millwork," and with other requirements specified.

1. Fire doors to be Category A with concealed intumescent strips where positive pressure is required by code.
2. Panel Designs: To match MDF / Veneer Stile and Rail doors in every detail.
3. Grade: Custom.
4. Finish: Transparent or Opaque as scheduled.
5. Wood Species and Cut for Transparent Finish: To match Veneer Stile and Rail doors in every detail.
6. Door Construction: Core material shall allow panel profiles to match non rated doors.
7. Edge Construction: Stiles to be constructed for improved screw holding by use of manufacturer’s standard hardwood edge system to extend the entire height of door. Softwoods are not allowed.
8. Stile and Rail Widths: To match MDF / Veneer Stile and Rail doors in every detail

9. Molding Profile (Sticking): Recessed square or as selected by Architect from manufacturer's full range.
10. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
11. Provide WI-Certified Compliance Certificate indicating that doors comply with requirements of grades specified.

2.3 SOUND-CONTROL PANELS

A. Provide sound-control panels of same materials, construction, sound rating, and finish as specified for adjoining sound-control doors.

2.4 SOUND-CONTROL HARDWARE

A. Description: Provide manufacturer's standard sound-control system, including head and jamb seals, door bottoms, hinges, and thresholds, as required by testing to achieve STC and fire rating indicated.

B. Auto door bottoms shall be fully mortised type at public spaces.

2.5 STILE AND RAIL MDF DOOR FABRICATION

A. Fabricate stile and rail MDF doors in sizes indicated for field fitting.

B. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels unless otherwise indicated:

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/2 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide not more than 3/8 inch from bottom of door to top of threshold or finish floor.

    a. Comply with NFPA 80 for fire-rated doors.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
3. Bevel fire-rated doors 1/8 inch in 2 inches on lock edge; trim stiles and rails only to extent permitted by labeling agency.

C. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W Series standards, and hardware templates.

1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.

D. Glazed Openings: Trim openings indicated for glazing with solid wood moldings, with one side removable. Miter wood moldings at corner joints.

E. Glazed Openings: Glaze doors at factory with glass of type and thickness indicated, complying with Division 8 Section "Glazing." Install glass using manufacturer's standard elastomeric glazing sealant complying with ASTM C 920. Secure glass in place with removable wood moldings. Miter wood moldings at corner joints.

F. Transom and Side Panels: Fabricate panels to match adjoining doors in materials, finish, and quality of construction.

G. Provide hardware that complies with Division 8 Section "Door Hardware."

2.6 SHOP PRIMING

A. Doors for Opaque Finish: Shop prime doors with low VOC water based primer. Seal all four edges, edges of cutouts, and mortises with primer. Refer to Door Schedule.

B. Doors for Transparent Finish: Shop prime doors with stain (if required) and other required pretreatments. Seal all four edges, edges of cutouts, and mortises with first coat of finish. Refer to Door Schedule.

2.7 FINISHING

A. Prime paint MDF stile and rail doors at factory, scheduled to receive opaque finish.

1. Color: As selected by Architect and Owner from manufacturer’s full range.

B. For Veneer stile and rail doors indicated to be factory finished, comply with AWI's "Architectural Woodwork Quality Standards," WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors," and with other requirements specified.

1. Finish faces and all four edges of doors, including mortises and cutouts. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises; however surfaces not stained shall be sealed.

2. Color and sheen to match Architect’s control sample.

C. Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Transparent Finish:

1. Grade: Custom.
2. Finish: AWI catalyzed polyurethane finish system.
3. Staining: Match Architect's approved sample.
4. Effect: Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores.
5. Sheen: Satin.

E. Opaque Finish:

1. Grade: Custom.
2. Finish: AWI catalyzed polyurethane finish system.
3. Color: Match Architect's approved sample.
4. Sheen: Semigloss.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and substrates, with Installer present, for suitable conditions where wood stile and rail doors and fire-rated wood door frames will be installed.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install fire-rated wood door frames level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Countersink fasteners, fill surface flush, and sand smooth.

B. Hardware: For installation, see Division 8 Section "Door Hardware."

C. Install doors to comply with manufacturer's written instructions, WDMA I.S.6, "Industry Standard for Wood Stile and Rail Doors," AWI's "Architectural Woodwork Quality Standards," WI's "Manual of Millwork," WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors," and other requirements specified.

1. Provide WI-Certified Compliance Certificate for Installation.
2. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

D. Field-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/2 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 3/8 inch from bottom of door to top of threshold.

a. Comply with NFPA 80 for fire-rated doors.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
3. Bevel fire-rated doors 1/8 inch in 2 inches on lock edge; trim stiles and rails only to extent permitted by labeling agency.

E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

F. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

G. Sound-Control Seals: Where seals have been prefit and preinstalled in the factory and subsequently removed for shipping, reinstall seals and adjust according to manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

A. Testing Services: Acoustical testing and inspecting agency shall select one sound-control door(s) at random from sound-control door assemblies that are completely installed and perform testing for verification that assembly complies with STC rating requirements.

1. Field tests shall be conducted according to ASTM E 336, with results calculated according to ASTM E 413. Acceptable field STC values shall be within 5 dB of laboratory STC values.
2. Inspection Report: Acoustical testing agency shall submit report in writing to Architect and Contractor within 24 hours after testing.
3. If tested door fails, replace or rework all sound-control door assemblies to bring them into compliance at Contractor's expense.

a. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

B. Prepare test and inspection reports.

3.4 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08212

SECTION 08311 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Access doors and frames for walls and ceilings.

    a. Provide access doors as required in walls and gypsum wall board ceilings for access to equipment and operational controls, where removal for access of ceilings are not scheduled or shown on the Drawings.

B. Related Requirements:

1. Division 15 Section "Duct Accessories" for heating and air-conditioning duct access doors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, fire ratings, materials, individual components and profiles and finishes.

B. Shop Drawings

1. Include plans, elevations, sections, details, and attachments to other work.
2. Detail fabrication and installation of access doors and frames for each type of substrate.

C. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.

D. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics according to the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. NFPA 288 for fire-rated access door assemblies installed horizontally.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

A. Basis-of-Design Product:

1. Karp Associates, Inc.

2. Subject to compliance with requirements, provide product indicated or comparable product by one of the following:

a. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
b. Larsen's Manufacturing Company.
c. Milcor Inc.

B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.

2.3 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

C. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

D. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

E. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.

F. Aluminum Sheet: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than strength and durability properties of Alloy 5005-H15; with minimum sheet thickness according to ANSI H35.2.

G. Frame Anchors: Same type as door face.

H. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.4 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness. Paint to match adjacent surface in public areas.

C. Access Panel Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.

1. For concealed flanges with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded metal lath and exposed casing bead welded to perimeter of frames.
3. Provide mounting holes in frames for attachment of units to metal or wood framing.
4. Provide mounting holes in frame for attachment of masonry anchors.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

2.5 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Steel Finishes:

1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

2. Field paint to match adjacent surface or color selected by Architect if adjoining finish is not painted.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08311

SECTION 08336 – OVERHEAD COILING DOORS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Overhead coiling doors.

1.2 RELATED SECTIONS

A. Section 05500 - Metal Fabrications: Support framing and framed opening.

B. Section 06105 - Finish Carpentry: Pressure treated wood jambs.

C. Section 08710 - Door Hardware: Product Requirements for cylinder core and keys.

D. Section 09900 - Painting: Field applied finish.

1.3 REFERENCES

A. NFRC 102 - Test Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems.

B. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Element.

C. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

D. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

E. ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

F. ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

G. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

A. Overhead coiling non-insulated doors:
   1. Wind Loads: Design door assembly to withstand wind/suction load per the wind load drawings or as required by FBC without damage to door or assembly components in conformance with ASTM E 330.
   2. Operation: Design door assembly, including operator, to operate for not less than 20,000 cycles.

B. Single-Source Responsibility: Provide doors, tracks, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

C. Windborne: Provide overhead coiling doors that pass cyclic-pressure tests according to ASTM E 1996 for the wind zone for the building location, the requirements per FBC or as noted and scheduled.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Details of construction and fabrication.
   4. Installation instructions.
   5. FBC NOA product approval.

C. Shop Drawings: Include detailed plans, elevations, details of framing members, anchoring methods, required clearances, hardware, and accessories. Include relationship with adjacent construction.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.

F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

G. Operation and Maintenance Data: Submit lubrication requirements and frequency, and periodic adjustments required.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years’ experience in the fabrication and installation of security closures.

B. Installer Qualifications: Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by Architect.
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.

D. Closeout Submittals – Maintenance and warranty data.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

C. Store materials in a dry, warm, ventilated weathertight location.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 COORDINATION

A. Coordinate Work with other operations and installation of adjacent materials to avoid damage to installed materials.

1.10 WARRANTY

A. Warranty: Manufacturer’s limited door and operator system, except the counterbalance spring and finish, to be free from defects in materials and workmanship for 3 years or 20,000 cycles, whichever occurs first.
B. Warranty: Manufacturer’s limited door warranty for 2 years for all parts and components.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com.
E-mail: info@overheaddoor.com, or architect approved equal.

B. Subject to the compliance of the specified requirements a comparable product by one of the following manufacturers will be considered.
    a. Clopay.
    b. Cookson Company.
    c. Cornell Iron Works, Inc.
    d. Raynor.
    e. Wayne-Dalton Corp.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 OVERHEAD COILING SERVICE DOORS

A. Overhead Coiling Service Doors: Overhead Door Corporation Model 625.
    1. Curtain: Interlocking roll-formed slats as specified following. Endlocks shall be attached to each end of alternate slats to prevent lateral movement.
        a. Flat profile type F-265i for doors up to 40 feet (12.19 m) wide.
        b. Front slat fabricated of:
            1) 18 gauge galvanized steel.
        c. Back slat fabricated to match front slat
        d. Non-insulated door slats are acceptable

    2. Performance:
        a. Wind load resistance as specified, shown on the drawings or required by FBC.
    3. Finish:
        a. Galvanized Steel: Slats and hood galvanized in accordance with ASTM A 653 and receive rust-inhibitive, roll coating process, including 0.2 mils thick baked-on prime paint, and 0.6 mils thick baked-on polyester top coat.
            1) Powder coat: PowderGuard
                (a) PowderGuard Weathered Finish: Industrial textured powder coat provides a thicker, more scratch resistant coat. Applied to entire door system including slats, guides, bottom bar and head plate color as selected by the Architect.
            2) Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer.
    4. Weatherseals:
        a. Vinyl bottom seal, exterior guide and internal hood seals.
        b. Interior guide weatherseal.
        c. Lintel weatherseal.
    5. Bottom Bar:
        a. Two galvanized steel angles minimum thickness 1/8 inch (3 mm) bolted back to back to reinforce curtain in the guides.
    6. Guides: Three Structural steel angles
        a. Finish: PowderGuard Weathered finish with iron/black powder.
    7. Brackets:
        a. Galvanized steel to support counterbalance, curtain and hood.

8. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel, supporting the curtain with deflection limited to 0.03 inch per foot of span. Counterbalance is adjustable by means of an adjusting tension wheel.
9. Hood: Provide with internal hood baffle weatherseal.
    a. 24 gauge galvanized steel with intermediate supports as required.
10. Manual Operation:
    a. Chain hoist; endless steel hand chain, chain-pocket wheel and guard and gear-reduction unit with maximum 25 lbf force for door operation (reversible).
11. Electric Motor Operation: Provide UL listed electric operator, size as recommended by manufacturer to move door in either direction; provide alley-steel hand chain holder secured to operator guide at not less than 2/3 foot nor more than 1 foot per second; with controller (disconnect switch) for motor exposure indicated.
    a. Sensing Edge Protection:
        1) Pneumatic sensing edge.
        2) Electric sensing edge.
    b. Operator Controls:
        1) Push-button operated control stations with open, close, and stop buttons at interior.
        2) Key operation with open, close, and stop controls.
        3) Push-button and key operated control stations with open, close, and stop buttons at exterior.
        4) Controls surface mounted at interior.
        5) Controls flush mounted at exterior.
    c. Motor Exposure: Humid; interior.
    d. Comply with NFPA 70.
    e. Single phase 208 volts, Hertz 60
    f. Special Operation:
        1) Vehicle detector operation.
        2) Radio control operation.
        3) Card reader control.
        4) Photocell operation.
        5) Door timer operation.
        6) Commercial light package.
        7) Explosion and dust ignition proof control wiring.
    g. Motor Voltage: 115/230 single phase, 60 Hz.
12. Windload Design:
    a. FBC certification FL# to meet wind loading specified or shown on the drawings, and per FBC requirements.
13. Locking:
    a. Chain keeper locks for chain hoist operation.
    b. Interior slide bolt lock for electric operation with interlock switch.
    c. Cylinder lock, exterior only.
        1) cylinders specified in for electric operation with interlock
14. Wall Mounting Condition:
    a. Between jambs mounting.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify opening sizes, tolerances and conditions are acceptable.

B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.

F. Install perimeter trim and closures.

G. Instruct Owner’s personnel in proper operating procedures and maintenance schedule.

3.4 ADJUSTING

A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.

B. Adjust hardware and operating assemblies for smooth and noiseless operation.

C. Lubricate bearings and sliding parts as recommended by manufacturer.

D. Adjust seals to provide a tight fit around entire perimeter.

3.5 CLEANING

A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.

B. Remove labels and visible markings.

C. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 PROTECTION

A. Protect installed products until completion of project.

END OF SECTION 08336

SECTION 08342 – MOTOR OPERATED HYDRAULIC-SINGLE HANGAR DOOR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes individually motor operated “one piece” hydraulically operated hangar door and defines the nature and quality of required doors and their minimum standards of construction and operation.

B. Related Sections include the following:

1. Division 3 Section "Concrete" for concrete foundations, bottom rails, cross ties, and anchor-bolt installation.
2. Division 9 Section "Painting" for finishes, touch-up of shop coat, field welds and field bolts.
3. Division 8 Section “Steel Doors and Frames” for personnel doors and frames supplied by others to be installed in hangar doors.
4. Division 13 Section "Metal Building Systems" for metal siding panels, metal liner panels, jamb and corner trim, siding accessories, top guide supporting steel and bracing.
5. Division 16 Section "Electrical Basic Materials and Methods" for field wiring, conductors, conduit, boxes, exit lights and installation of trolley duct system.

1.3 DEFINITIONS

A. General: Hangar door for clear opening 100’-0” wide by 28’-0” high and consisting of a single leaf / panel hydraulically operated door system with hydraulic pistons at each jamb, flush mounted with exterior walls. Each door system to be complete with hinges pumps, heavy duty hydraulic cylinders wind load framing, operators, stops controls, hardware, flashing, trim top bottom truss, weather seal, etc., as required for a complete door assembly.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

General: The hangar door system shall be designed to the same requirements for live, dead end wind loads as the hangar building. The door shall be engineered to resist all anticipated loads without sagging, bowing or conflicting with its smooth and efficient

operation. Refer to the drawings for additional loading requirement. Door System Design Building Design and Contractor Coordination:

1. Pre-engineered hydraulically-operated-top-hinged-hangar-door system for a complete assembly.
2. The door manufacturer shall furnish for other trades all drawings and details for any structural steel, bracing, holes required that will be part of building construction performed under other Divisions of the specifications, required for proper installation of the door. Drilling of holes, cutting or any other work affecting the structural framing of the building shall be subject to approval of the metal building Engineer of Record.
3. Furnish all supervision, labor, materials, tools, equipment, and services required for fabrication and erection of the motor operated hangar doors in strict accordance with the specifications and applicable drawings.
4. The following standards and requirements shall be included and coordinated by the Contractor with the door manufacturer and metal building manufacture:

    a. ASTM A-36 structural steel framing and bracing for door.
    b. Full depth horizontal girting to accommodate the exterior preformed metal building siding and the interior preformed metal liner panel, full height of the doors.
    c. The building steel header design shall be coordinated with the hangar door manufacturer, and shall be designed to accommodate horizontal and vertical building deflections to support the “one piece” door in all positions, along with the proper lateral steel bracing.
    d. The building door jamb-steel-columns shall be framed and of the proper design and size to reinforce the opening and to carry all loads and vibrations imposed by the door to these structural members, along with the proper lateral steel bracing..
    e. Complete weather-stripping; including flexible-door-head wind curtain weathering.
    f. All required hardware for motor operation.
    g. Complete electrification system and supports.
    h. The Contractor shall furnish and install a prewired electrical door operating mechanism to control each “One Piece” hydraulic door. The Contractor is responsible and required to completely install the prewired electrical door operating mechanism, push button controls, devices and electrical conduit and wiring to the door operating controls. Control panel with 24volt up/down/off switch pre-wired to motor, and over-ride controls with the required number of adequately sized insulated electrical conductors.
    i. All electrical controls and devices shall conform to the requirements of the current National Electrical Code 513, NEMA, and be UL approved. Provide UL Listed Electric Operator, size and type as recommended by the manufacturer. The door operator shall be furnished complete by the door manufacturer and shall consist of a motor and factory-wired control panels consisting of main fused disconnect switch, magnetic reversing starters, limit switches and push button controls, control circuit transformer, relays, timing devices, and warning devices..

j. One coat of primer paint on all fabricated structural steel, and painted factory finished on all pre-assembled components. Refer to paint specifications for finish painting requirements.
k. Complete engineering drawings, calculations and required submittals sealed by the door manufacturer's registered professional engineer licensed in the State the door is to be installed at.
l. Door erection/installation.
m. Maintenance and operating manuals.
n. Guarantee of complete installation.

5. Design criteria: The door shall be designed and constructed in accordance with the latest American Institute of Steel Construction Specifications. They shall consist of standard structural sections of ample size and strength for the loads and stresses imposed under the specified conditions. Structural shapes and flat plates shall be in accordance with ASTM Designation A-36.

a. The door as a completed unit shall be designed to withstand the minimum external and/or internal wind load as indicated on the structural drawings under the Main Wind-force Resistant system provisions of the current edition of the Florida Building Code (FBC) and per ASCE 7-98.
b. The wind load deflection shall not exceed the door height in inches divided by 120.
c. The fiber stresses in the door members due to combine dead and wind loads shall not exceed 24,000 psi.

1.5 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of the following hangar door system components:

1. Structural-framing system and summary of forces and loads on walls and jambs and engineering signed and sealed drawings or Florida Product Approval (NOA).Electrical control system.
2. Electrical wiring diagram.
3. Door hydraulic pump units.
4. Accessories.
5. Setting drawings, template, and installation instructions for built-in or embedded anchor devices.

B. Shop Drawings: For the following hangar door system components shall include plans, elevations, sections, details, and attachments to other Work, as follows.

1. The door manufacturer shall submit for approval all design and shop drawings and complete calculations of all structural, mechanical, electrical and operational features of the doors, sealed by registered Professional Engineer licensed to practice in the State pf the project location. Field wiring diagrams, schematic wiring diagrams and physical location of electrical controls drawings shall be provided. The shop drawings shall name and list in detail the components used in and on the

doors, including the manufacturer's name, catalog number and a full description of the component.

2. Complete calculations shall be submitted with the shop drawings. Shop drawings submitted without these calculations will be returned marked "Revise and Resubmit".
3. Submit shop drawings for approval prior to fabrication. Include detailed plans, elevations, and details of framing members, required clearance, anchors and accessories. Include relationship with adjacent materials. The make and type of door, operators and controls shall be clearly shown. Door weight method of suspension, operation, and all fastenings shall be indicated.
4. Submit (four) copies each of the following manufacturer's Manuals / Diagrams
    a. "One Piece" Hydraulic Door Literature
    b. Installation Manual
    c. Operating Instructions
    d. Maintenance data / manual.
    e. Safety Decal Placement Guide Manual / Warning Labels
    f. Electrical System Manual for the "One Piece" Hydraulic Door system
        1) Electrical Schematics
        2) Electrical Wiring Diagram

    g. Diagrams of potentially hazardous locations related to the operation of the door.

5. Submit shop drawings specific for this project.
   NOTE: Generalized project drawings not specific to this project will not be acceptable.

C. Product Certificates: Signed by the manufacturer of hangar door systems certifying that products furnished comply with requirements.

D. Letter of Design Certification: Professional Engineer's certificate prepared and signed by a Professional Engineer, legally authorized to practice in the State where Project is located, verify that the structural framing meets the indicated loading and deflection requirements and codes of Authorities Having Jurisdiction. Include the following:

    a. Name and location of Project.
    b. Order number.
    c. Name of manufacturer.
    d. Name of Contractor.
    e. Door dimensions, including width and height.
    f. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
    g. Governing building code and year of edition.
    h. Design Loads: Include dead load, deflection, wind loads/speeds and exposure, seismic zone, or effective peak velocity-related acceleration/peak acceleration.

E. Manufacturer Certificates: Signed by manufacturers certifying that they comply with requirements. Include evidence of manufacturing experience.

F. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names, and addresses of architects and owners, and other information specified.

G. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Erector Qualifications: An experienced erector who has specialized in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.

B. Professional Engineer Qualifications: A professional engineer who is licensed and legally qualified to practice in the State where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of hangar door systems that are similar to those indicated for this Project in material, design, and extent.

C. Manufacturer Qualifications: A firm experienced in manufacturing hangar door systems similar to those indicated for this Project and with a record of successful in-service performance.

1. Doors and operating mechanisms shall be manufactured by a door manufacturer who has been continuously engaged in the design, manufacture, and installation of hydraulic aircraft hangar doors for over ten (10) years. The manufacturer will support with written evidence that they have designed, manufactured and installed a minimum of ten (10) motor operated door systems which have been in satisfactory operation for a minimum of three (3) years, with a minimum of ten (10) installations that are equal to or in excess of 20’-0” high.
2. Written evidence will include at least ten (10) hangar door installations of the hydraulic operated type, made by their company. Such list shall include name of installation, location, Owner, Architect, date installed and specific data as to size of doors, type of motors / pumps, safety devices, operating systems, , weather-stripping, etc. Written evidence shall list only door installations that have been designed, manufactured and installed by the submitting door manufacturer. The door manufacturer must certify that they will design and fabricate 90 percent or more of the door system by their personnel and in their facilities.
3. Engineering Responsibility: Preparation of Shop Drawings, testing program development, test result interpretation, and comprehensive engineering analysis by a qualified professional engineer.

D. Source Limitations: Obtain each type of the hangar door system component through one source from a single manufacturer.

E. Structural Steel: Comply with AISC S335, "Specification for Structural Steel Buildings--Allowable Stress Design, Plastic Design"; or AISC S342, "Load and Resistance Factor Design Specification for Structural Steel Buildings," for design requirements and allowable stresses.

F. Pre-Installation Conference: Schedule a pre-installation conference prior to commencement of field operations that might affect installation of the “One Piece” hydraulic door to establish procedures for maintaining optimum working conditions, and to coordinate this work with related and adjacent work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, panels, and other manufactured items so as not to be damaged or deformed. Package items as required for protection during transportation and handling. Deliver materials and products in manufacturer’s labeled protective packages.

B. Handling: Unload, store on timbers or pallets above ground level to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight and ventilated covering. Do not store material in contact with other materials that might cause staining, denting, or other surface damage.

D. Store and handle in strict compliance with manufacturer’s written instructions and recommendations. Protect from damage from weather, excessive temperatures, and constructions operations.

E. Inspect the “One Piece” hydraulic door upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to Architect. Otherwise, remove and replace damaged items as directed.

F. Place the “One Piece” hydraulic door frame units on a minimum of 4” high wood blocking. Store doors components & packages at building site under cover. Avoid use of non-vented plastic or canvas shelters which could create humidity chamber. If the cardboard wrapper on door becomes wet, remove carton immediately.

G. The Contractor shall store the sheet, panels, components, and other manufactured items so that they will not be damaged or deformed. Store metal sheets or panels so that any water accumulations will drain freely. Do not store sheets or panels in contact with other materials which might cause staining.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when weather conditions permit work to be performed according to manufacturer's written instructions and warranty requirements.

B. Field Measurements: Verify door opening by field measurements after the metal building has been erected and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions for Doors: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabrication of the door leaves without field measurements. Coordinate the door opening construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.9 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

1. Manufacturer's Warranty Period: Two years from date of Substantial Completion signed by the door manufacturer and installer.
2. Four (4) complete three ring binders containing instructions for proper operation and maintenance of the doors shall be furnished to the Owner. They shall contain complete:

    a. Operating instructions.
    b. Maintenance instructions.
    c. A chart showing all points to be lubricated, type of lubricant and frequency of lubrication.
    d. A chart giving a checklist of parts to be serviced and adjusted and the frequency of adjustment.
    e. A complete list of spare parts.
    f. A manufacturer's catalog for every component used in or on the doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: The basis of design shall be Schweis's "One Piece" hydraulic hangar door, P.O. Box 220, Fairfax, MN 55332, Phone (507) 426-8273, Fax (507) 426-7408. Subject to compliance with requirements, of these specifications products approved in writing by the Architect and the Owner will be accepted.

B. Manufacturer's seeking approval of the product shall comply with the product substitution requirements in Division 01, prior to receipt of the bids for the project.

2.2 STRUCTURAL MATERIALS

A. Structural-Steel Shapes: ASTM A 36.

B. Steel Plate, Bar, or Strip: ASTM A 36

C. Steel Tubing or Pipe: ASTM A 500, Grade B; ASTM A 501; or ASTM A 53, Grade B.

D. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.
2. Direct-Tension Indicators: ASTM F 959, Type 325, or Type 490
   a. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50, epoxy coated.

E. Primers: As selected by manufacturer for resistance to normal atmospheric corrosion, compatibility with finish paint systems, capability to provide a sound foundation for field-applied topcoats despite prolonged exposure, and as follows:

1. Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer; complying with performance requirements of FS TT-P-664.

2.3 MISCELLANEOUS MATERIALS

A. Finish Painting: Refer to Division 9 Section "Painting."

2.4 FABRICATION, GENERAL

A. Door Construction: Door members in sizes suitable for convenient shipping shall be bolted and/or welded construction. Joints shall develop 100 percent of the strength of the framing members. Vertical members shall be continuous throughout the height of the door. The sections and framing members of which they are composed shall be true to dimension and square in all directions and shall not be out of line more than 1/8 inch in 20 feet. Vertical and horizontal members adjacent to each other and/or being joined in the field shall be accurately prepared to facilitate field assembly. Full depth members spaced vertically shall be provided for proper lateral support of inside and outside flanges for all main members. Diagonal bracing shall be provided so that the completed leaf assembly will be adequately braced to withstand shipping, assembly, and operational loads.

1. Fabrication of door shall be done in jigs so as to hold the sections to specified tolerances. Exposed welds and welds, which interfere with the installation of various parts, such as exterior panels and liner panels, etc., shall be ground smooth.

2. The exterior door covering shall be pre-formed metal panels of the type and gauge, furnished and installed as specified in Division 13 “Metal Building Systems”.

3. Weathering: Material, which is adjustable and readily replaceable, shall be provided at all necessary vertical edges, head and sill to afford a substantially weather-tight installation.

4. Weathering shall be properly fitted and adjusted to close all openings. It shall be fitted at the factory, marked, and removed before shipment. Clearances between

metal parts on vertical edges of leaves and between leaves and jambs, which are to be weathered, shall not be less than three (3) inches.

5. Provide manufacturer's seal continuous at top, bottom of each door. The sides of the "One Piece" Hangar door shall be sealed off with a special weather stripping. The entire door perimeter must be weather tight.

6. The door shall be equipped with neoprene weather stripping at heads and jambs to prevent flow of moisture into the door installation. Sills shall have a special fabric reinforced high grade rubber astragal. The entire door perimeter shall be weather tight.

7. Hangar door shall be electrically operated "One Piece" hydraulic type and shall be integral with the hangar building design.

8. When in the open position the door shall have a slight slope to direct drainage away from the building.

9. Door shall be hinged horizontally at the top and be arranged to open by moving frame out & up.

10. Door frames shall have pre-located top hinges to align with the building truss and steel framing members.

11. Door shall be self-contained with only the top hinges; side column cylinders supports legs.

12. The door framework shall consist of jig welded steel tube sections engineered by the door manufacturer to resist all anticipated loads without staffing, bowing or conflicting with its smooth operation.

13. Structural steel door framing members shall be ASTM A500 Grade B square structural welded steel tubing.

14. Provide an integral steel safety truss and brace at the bottom leading-edge of the door exterior.

15. Furnish all labor, materials, accessories, equipment, and services necessary to furnish a complete installation of a "One Piece" hydraulic hangar door, as indicated by the manufacturer. Including frame, sections, brackets, guides and side column cylinders supports legs, hardware, operators and installation instructions.

B. Hardware: Hardware shall be designed and manufactured expressly for use on aircraft hangar doors. The door manufacturer shall provide top guide roller assemblies, and required hardware for operation of the door as part of the finished door.

1. The hangar doors shall not be equipped with locking devices, except as specified for personnel doors.

2. Rubber bumpers shall be provided on the leading and trailing edges at top and bottom as required preventing the door from coming in contact with the end walls or any other obstruction.

C. Metal Siding:

1. Install door skins to completely clad the door frames, use noncorrosive fasteners.

2. The hangar door covering shall meet the requirements as specified for the metal siding of the hangar and the exposed surface shall be colored to match the exterior siding of the hangar.

3. Install the door skin and all trims according to the “One Piece” door recommendations.

D. Shop Paint: Door framing members shall be thoroughly cleaned of loose scale, shavings, filings, dirt, dust, or other objectionable materials that would interfere with the bond of paint.

1. All shop painting shall be done in accordance with good practice for such work. No painting shall be done in freezing weather. All painting shall be done in dry weather or under cover and surfaces of steel shall be free from moisture when painted.

2. All metal surfaces shall be given a priming coat of rust inhibitive paint.

3. Special care shall be taken in painting mechanisms, limit switches, electrical controls, etc., so that paint is applied to finished or to bearing surfaces. Components supplied by other manufacturers having painted surfaces need not be painted.

E. Operating System: Operation of each door shall be by hydraulic cylinders with one at each door jamb.

F. Electrical Controls: The door manufacturer shall furnish the doors with the proper electrical equipment and controls, built in accordance with the latest NEMA Standards. All equipment, power and control circuits shall be installed in accordance with the National Electrical Code, Standard No. 70, and the requirements of Authority Having Jurisdiction. Any equipment located eighteen (18) inches or less above the floor shall be explosion proof.

1. Magnetic reversing starters shall be enclosed in a NEMA 12 enclosure with a three pole fused lockable disconnect in the cabinet door and shall be factory wired and equipped with overload and under voltage protection, mechanical and electrical interlocks, relays, timing devices and transformers for the control circuits. A wiring diagram shall be placed on the inside of each enclosure cover.

2. The door shall be controlled by a constant pressure 2-button push button station, mounted on accessible interior faces at each end as required for a safe operable condition. Removing pressure from the buttons shall stop the hydraulic pump and set the brakes. Controls shall not be reversible. All interior push buttons shall be in

NEMA 12 enclosures with mushroom head buttons. All exterior push buttons shall be in NEMA 4 enclosures with mushroom head buttons

3. Limit switches shall be provided to stop the travel of the door in their fully opened or fully closed position. The limit switched shall be positive acting snap action type with actuating cams designed with sufficient over travel to permit the group to come to a complete stop without over traveling the limit switches. The limit switches shall be mounted on the power leaf with actuating cams mounted on the top guides overhead.

4. Interlocks shall be provided at hollow metal personnel door where shown on the drawings, that are located within the hangar door. Interlock shall prevent motor operation of the hangar door group when the personnel door is open. Provide an indicator light at door control stations indicating when the personnel door is open.

5. A clearly audible signal shall be provided on each hangar door and shall operate when the push buttons are actuated for movement of the doors in either direction. The signal device shall be not less than a six (6) inch diameter bell or equivalent decibel rated horn loud enough to be clearly heard in the hangar and on the apron. The signal shall sound continuously when the door group is in motion.

6. Each control enclosure shall be completely shop wired and be provided with a numbered terminal strip for the convenience of the electrical contractor.

F. Hydraulic Gear Motor Pump:

1. The hydraulic gear Motor pump system must stop and hold door in any position of the door travel.

2. Provide high starting torque, reversible, continuous duty, class A insulated, electric motors complying with NEMA MG 1, with fused protection, sized to start, accelerated and operate door in either direction from any position.

3. A magnetic starter with 24v control unit for reliability is standard.

4. Design operator so motor may be removed without disturbing limit switch adjustment and without affecting emergency auxiliary operator.

G. Electrical Wiring and Source of Power: All flexible wire ducts, conduit and fittings, flexible multi-conductor cables, junction boxes, and all labor to wire and connect to and between all electrical equipment on the doors shall be installed in accordance with the door manufacturer’s approved wiring diagrams and drawings by the electrical contractor.

1. If permanent electrical power is not available when the doors are installed, the electrical contractor shall obtain a temporary source of electrical power so the doors may be tested and adjusted under power.

2. The door manufacturer's wiring diagrams shall include a complete schematic wiring diagram; a field wiring diagram; a complete physical location drawing showing the location of all controls with the runs of conduit, size of conduit, number and size of wires in each conduit, location of junction boxes and full details of control mountings.

3. Provide Electrical Disconnect to completely disable the door, for service, maintenance, emergency backup operations.

4. Mount disconnect so it is accessible from floor level.

2.5 WALL PANELS

A. Panels (exterior) shall be provided by the metal building manufacturer. Refer to Division 13 Section "Metal Building Systems" for metal siding panels, metal liner panels, jamb and corner trim, siding accessories, wall insulation, top guide supporting steel and bracing requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the hangar door system.

1. Prepare a written report, listing conditions detrimental to performance of work.

2. Proceed with erection only after unsatisfactory conditions have been corrected.

3. Examine wall and overhead areas, including opening framing and blocking with the door installer present for compliance with requirements for installation tolerance, clearances and other conditions affecting performance of Work of this section.

4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:

1. Door manufacturer is required to coordinate with the metal building manufacturer in the development of the exact installation details and provide weights and door loadings to building manufacturer.

2. Install door, cylinder columns and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers and equipment

supports according to Shop Drawing manufacturer's written instructions and as specified.

3. Fasten / Hang horizontal track, hinges from structural overhead framing with angle or channel hangers welded and/or bolt fastened in place. Fasten and hang vertical cylinder columns, from structural column framing with angle or channel hangers welded and / or bolt fastened in place. Provide sway bracing, diagonal bracing and reinforcement as required for rigid installation of track, hinges, and door-operating equipment.

B. Recommended Clear Opening

1. Each "One Piece" door has a recommended clear opening setting, specified by the manufacture. Do not over travel the door beyond the recommended setting.

C. Apply Proper Safety Markings

1. Apply Proper Markings for any potentially hazardous locations related to the operation of the door.

2. Follow the pictorial diagram included in the door installation manual.

D. Installing Warning Labels

1. Furnish warning labels for any potentially hazardous locations related to the operation of the door. Fasten warning labels to the "One Piece" hydraulic door frame and by the operator's station in accordance with manufacturer's instructions, NO EXCEPTION.

E. Installer Certificates:

1. Signed by manufacturer certifying that installers comply with specified requirements.

F. Installing Services: (Optional)

1. Install Representative, Manufacturer's representative to supervise assembly of door.

3.3 ERECTION

A. Erect metal building system according to manufacturer's written instructions and erection drawings.

B. Do not field cut, drill, or alter structural members without written approval from the hangar door manufacturer's professional engineer.

C. Hangar doors shall be erected when the hangar roof has been completed and is in its proper position under full dead load. When the hangar roof is completed and in position, the door guides shall be adjusted in relationship to the rails to the proper line, gauge, and elevation in accordance with the approved tolerances stated herein.

D. All hangar doors and accessories shall be assembled in strict accordance with the approved shop and erection drawings. The doors shall be installed **under the supervision of an authorized representative of the door manufacturer**, who shall be responsible for proper and satisfactory operation.

E. Align and adjust framing members before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Make adjustments to compensate for discrepancies in alignment.

3.4 WALL PANEL INSTALLATION

A. Exterior wall panels

1. Metal building erector to install the same exterior wall panels that are on the building for the siding use the same type on the “One Piece” hydraulic door. Install the proper trims that are recommended by the metal building manufacturer.

B. General: Provide panels full height as shown on building elevations, sections, and details. Install panels perpendicular to girts.

1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Install panels with vertical edges plumb. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
2. Unless otherwise indicated, begin panel installation at corners with center of rib lined up with line of framing.
3. Field cutting by torch is not permitted.
4. Align bottom of wall panels and fasten with blind rivets, bolts, or self-tapping screws.
5. Fasten trim and similar elements with self-tapping screws.
6. Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
7. Provide weather-resistant escutcheons for items penetrating wall panels and liner panels.
8. Use aluminum or stainless-steel fasteners for exterior applications and galvanized fasteners for interior applications.
9. Locate and space fastenings in true vertical and horizontal alignment.

C. Field-Assembled, Insulated Panels: Install wall panels on exterior side of doors. Attach panels to supports with fasteners as recommended by manufacturer. Install insulation and cover with liner panels.

D. Liner Panels: Install panels on interior side of doors at locations indicated. Fasten with exposed fasteners as recommended by manufacturer.

3.3 INSPECTION AND TESTING

A. Inspection of the hangar door installation will be made after erection is complete. Any defects disclosed by the test shall be corrected by the door manufacturer and the installation delivered in and acceptable operable condition.

3.4 CLEANING AND PROTECTION

A. Touchup Painting: Immediately after erection, clean, prepare, and prime or reprime welds, bolted connections, and abraded surfaces of prime-painted framing, accessories, and plates.

1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
2. Apply compatible primer of same type as shop primer used on adjacent surfaces.

END OF SECTION 08342

SECTION 08461 - SLIDING AUTOMATIC ENTRANCE DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes automatic entrance door systems with bi-parting sliding operation.

B. Ref. Division 8 Section “Aluminum Entrances, Storefront” for adjacent related work.

C. Ref. Division 8 Section "Door Hardware" for lock cylinders.

D. Ref. Division 8 Section "Glazing" for glazing requirements for automatic entrance doors.

E. Ref. Division 16 Sections for Electrical Requirements.

F. Ref. Appendix B – Owner furnished furniture, fixtures and equipment for access control devices.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide automatic entrance door systems that have the following capabilities based on testing manufacturer's standard units in assemblies similar to those indicated for this Project:

1. Operating Temperature Range: Door operators capable of operating between minus 10 deg F and plus 120 deg F.
2. Maximum Opening Force:

    a. Exterior Doors: 15 lbf.
    b. Interior Doors: 5 lbf.

1.4 SUBMITTALS

A. Product Data: For each type of sliding automatic entrance door indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, wiring diagrams, and attachments to other Work.

C. Hardware Schedule: Organize schedule into sets based on hardware specified. Include name of item and manufacturer, and complete designation of every item required for each automatic entrance door.

D. Submit shop drawings and product data under provisions of Section 01300 – Shop Drawings, Product Data and Samples.

E. Samples: For each exposed finish and for each color and texture required.

F. Product Certificates: Certifying that products furnished comply with emergency exit door requirements.

G. Maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer, approved by manufacturer to install and maintain manufacturer's products.

B. Manufacturer's Certificate: Issued by the American Association of Automatic Door Manufacturers.

C. Welding Standards: Comply with AWS D1.2, "Structural Welding Code--Aluminum."

D. ANSI/BHMA Standard: ANSI/BHMA A156.10, "Power Operated Pedestrian Doors."

E. UL Standard: Provide power door operators that comply with UL 325.

F. Emergency Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrance doors serving as a required means of egress.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturers agrees to repair or replace components of automatic entrance door system that fail in materials or workmanship, excessive air leakage, faulty operation of operators and hardware, or deterioration of metals, metal finishes, and other materials beyond normal weathering within three (3) years from date established in Specification Section 01770 “Closeout Procedures”.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Stanley Security Solutions, Inc.
2. Besam Inc.
3. Horton Automatics; Div. of Overhead Door Corporation.

C. The automatic door and glass shall be wind rated for an essential facility per FBC requirements.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated. Match finish of adjacent storefront.

1. Extruded: ASTM B 221.
2. Sheet and Plate: ASTM B 209.
3. Welding Rods and Bare Electrodes: AWS A5.10.

B. Glazing: As specified in Division 8 Section "Glazing" to be insulated and impact rated.

C. Sealants and Joint Fillers: Refer to Division 7 Section "Joint Sealants" for joints at perimeter of entrance system.

D. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, premixed, nonmetallic, noncorrosive, nonstaining grout; of consistency suitable for application.

E. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos; formulated for 30-mil thickness per coat.

2.3 AUTOMATIC ENTRANCE DOOR SYSTEM

A. General: Manufacturer's standard automatic entrance door system, complete with doors, sidelite and transom framing, operators, controls, activation devices, safety devices, and accessories as indicated.

1. Configuration: Bi-parting sliding doors, with sidelite on each side of door.

a. Traffic Pattern: Two-way.
b. Emergency Breakaway Capability
c. Mounting: Between jambs.

B. Activation Devices:

1. Infrared-scanner presence detector.
2. Security key pad and access control; the interior side of automatic doors heading to the secured – apron areas shall be accessed via a security keypad system and shall also be unlocked (or operated) from the FBO reception counter. A

security key pad shall also be provided at the exterior of the door for after hours access. Note that the security system access-control devices shall be provided by the owner.

C. Operator Safety Devices:

1. Photoelectric beams.

2.4 COMPONENTS

A. Doors: Manufacturer's 1-3/4-inch- thick glazed doors with minimum 0.125-inch-thick, extruded tubular stile and rail members impact rated glass for essential facilities. Fabricate corners with mechanically fastened reinforcing brackets or by welding. Incorporate concealed tie-rods that span full length of top and bottom rails and reinforcing for wind loading requirements.

1. Glazing Stops and Gaskets: Manufacturer's standard snap-on, extruded-aluminum, bevel glazing stops and preformed resilient glazing gaskets.
2. Stile Design: Medium stile.
3. Rail Design: 6-1/2-inch nominal height, 10 inch minimum at sill member.
4. Muntin Bars: Horizontal tubular rail member for each door; match stiles and rails.

B. Framing Members: Fabricate from extruded aluminum or formed-aluminum sheet or plate.

1. Main Extrusions: Minimum wall thickness of 0.125 inch.
2. Extruded Glazing Stops and Applied Trim: Minimum wall thickness of 0.062 inch.
3. Muntin Bars: Horizontal tubular rail members for sidelites; match stiles and rails.

C. Headers: Fabricated from minimum 0.125-inch thick, extruded aluminum or formed-aluminum sheet or plate. Conceal operator and roller track in header, providing access by means of hinged or removable access panel to permit service and adjustment. Secure panel to prevent unauthorized access.

1. Header Type: Concealed, fabricated to match depth of framing and to extend full width of door opening.

D. Carrier Assembly and Overhead Roller Track: Manufacturer's standard carrier assembly that allows vertical adjustment; consisting of nylon- or delrin-covered ball-bearing-center steel wheels operating on a continuous roller track, or ball-bearing-center steel wheels operating on a nylon- or delrin-covered continuous roller track. Support doors from carrier assembly by cantilever and pivot assembly.

1. Rollers: Minimum two ball-bearing roller wheels and two anti-rise rollers for each active leaf.

E. Sills: Manufacturer's standard sill members and bottom guide system, with stainless-steel ball-bearing-center roller wheels, and threshold and configuration indicated below:

1. Configuration: Saddle type threshold across door opening and pin-guide track system at sidelites.

F. Brackets and Reinforcements: Manufacturer's standard; compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components.

G. Fasteners and Accessories: Manufacturer's standard corrosion resistant, nonstaining, nonbleeding; compatible with adjacent materials.

1. Reinforcement: Reinforce members as required to retain fastener threads.
2. Exposed Fasteners: Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.

H. Signage: Comply with ANSI/BHMA A156.10.

2.5 DOOR OPERATORS

A. General: Of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.

1. Type: Power operated, complying with ANSI/BHMA A156.10.
2. Connections: For power and control wiring.
3. Adjustment Features: Fully adjustable without removing entrance doors, including adjustable speed, adjustable time delay for length of time door remains open, automatic door re-open if stopped while closing.
4. On/Off Feature: On/off/hold-open switch controls electric power to operator.

B. Electromechanical Operators: Self-contained overhead units, with power opening and closing mechanism, with checking in both opening and closing cycles, with safety-release clutch for obstructed closing, and that slides manually when power is off.

1. Closing Mechanism: Spring or Power operated.
2. Mounting: Concealed.

2.6 ACTIVATION AND SAFETY DEVICES

A. Infrared-Scanner Presence Detector: Self-contained, infrared-scanner presence-sensing device that activates door operator; that is adjustable to provide detection patterns and sensitivity equivalent to those required for control mats; and with metal or plastic housing in black finish.

2.7 HARDWARE

A. General: Refer to Division 8 Section "Door Hardware" for requirements for hardware items other than those indicated to be provided by automatic entrance door manufacturer.

B. Heavy-Duty Hardware: Provide units as indicated in size, number, and type recommended by manufacturer for entrances required. Finish exposed parts to match door finish, unless otherwise indicated.

C. Emergency Breakaway Hardware: Provide release hardware that allows panel to swing out in the direction of egress to a full 90 degrees from any position in the sliding mode with maximum force required to open panel of 50 lbf according to ANSI/BHMA A156.10. Interrupt operation of breakaway panel operator while in breakaway mode.

D. Deadlocks: Manufacturer's standard mortise hook bolt with 5-ply laminated steel, hook-shaped throw bolt, complying with ANSI/BHMA A156.5, Grade 1 requirements.

1. Cylinders: On door exterior, as specified in Division 8 Section "Door Hardware."
2. Two-Point Locking: Provide bottom bolt and mechanism that automatically throws active-leaf bottom bolt into threshold when deadlock engages inactive leaf and that provides one-stage unlocking.

E. Push Bars: As selected from manufacturer's full range.

F. Compression Weather Stripping: Manufacturer's standard replaceable, compressible gaskets of molded neoprene or molded PVC. Include bumper-type gaskets at door stops and laps.

G. Sliding Weather Stripping: Manufacturer's standard replaceable weather stripping of wool, polypropylene, or nylon woven pile, with nylon-fabric or aluminum-strip backing, complying with AAMA 701.

2.8 FABRICATION

A. Prefabrication: Complete automatic door fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.

1. Perform fabrication operations, including cutting, fitting, forming, drilling, and grinding of metalwork in manner that prevents damage to exposed finish surfaces. For hardware, perform these operations before applying finishes.
2. Prepare components to receive concealed fasteners and anchor and connection devices.

B. Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to GANA's "Glazing Manual."

D. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

E. Hardware: Install hardware, except surface-mounted hardware, at fabrication plant. Remove only as required for final finishing operation and for delivery to and installation at Project site.

F. Doors: Fabricate doors in profiles indicated. Reinforce as required to support imposed loads and for installing hardware. Factory assemble door and frame units.

1. Exterior Doors: Provide compression weather stripping at fixed stops. At locations without fixed stops, provide sliding weather stripping retained in adjustable strip mortised into door edge.

G. Framing: Fabricate tubular and channel frame assemblies in configuration indicated, with welded or mechanical joints according to manufacturer's standards. Provide subframes and reinforcement of types indicated or, if not indicated, as needed for a complete system to support required loads.

1. Exterior Framing: Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior. Provide anchorage and alignment brackets for concealed support of assembly from the building structure. Allow for thermal expansion of exterior units.

2.9 FINISHES

A. Aluminum High-Performance Organic Finish: Three-coat, thermocured system with fluoropolymer coats containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 605.2.

1. Color: To match aluminum entrances and window walls

PART 3 - EXECUTION

3.1 INSTALLATION

A. Templates and Diagrams: Furnish templates, diagrams, and other data to fabricators and installers of related work, as necessary for coordinating automatic entrance door installation.

B. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.

C. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact

concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

D. Entrances: Install entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place. Lubricate operating hardware and other moving parts.

1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
2. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

E. Door Operators: Install door operator system, including control wiring. Refer to Division 16 Sections and electrical drawings for connection to electrical power distribution system and security access control.

F. Activation and Safety Devices: Install control devices and wiring, including connections to door operators, as follows:

1. Infrared-Scanner Presence Detectors: Install scanners on both interior and exterior sides of each sliding automatic entrance door as indicated.

G. Glazing: Comply with installation requirements in Division 8 Section "Glazing."

H. Sealants: Comply with requirements in Division 7 Section "Joint Sealants" for installing sealants, fillers, and gaskets.

1. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction.
2. Seal frame perimeter with sealant to provide weathertight construction.

I. Adjusting: Adjust door operators, controls, and hardware for smooth and safe operation and for weathertight closure.

J. Security Access Control: Coordinate the interface and installation requirements for access control devices provided by the owner’s security contractor, and door operation requirements, (including wiring chase-ways/sleeves) and ensure proper operation of the door is achieved. The access control devices are to be located within the aluminum frame jambs of the door.

3.2 FIELD QUALITY CONTROL

A. Inspection: After completing installation, an inspector certified by the American Association of Automatic Door Manufacturers shall test and inspect each automatic entrance door for compliance with applicable ANSI/BHMA standards.

1. Inspection Report: Submit report in writing to Architect and Contractor within 24 hours after inspection.

B. Repair or remove and replace Work that does not comply with requirements.

3.3 DEMONSTRATION

A. Engage manufacturer's inspector certified by the American Association of Automatic Door Manufacturers to train Owner's maintenance personnel to adjust, operate, and maintain automatic entrance doors and operators. Refer to Division 1 Section "Closeout Procedures".

END OF SECTION 08461

SECTION 08710 – DOOR HARDWARE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Work covered by this Section of Specifications consists of furnishing and delivering to the jobsite for fitting and installation, all Finish Hardware complete, in accordance with this Section, applicable drawings, and contractor's shop drawings, and subject to the terms and conditions of the Contract. It is intended that the following list of hardware will cover all Finish Hardware to complete the project. Omissions and/or discrepancies shall be brought to the Architect's attention during the bidding period. THE HARDWARE PROVIDED WILL NEED TO MATCH THE AIRPORT'S "CAMPUS" STANDARD AND SHALL BE CONFIRMED BY THE CONTRACTOR PRIOR TO ORDERING MATERIAL. The electronic locks and panic devices will need to be compatible with the Airport's security system.

B. The Contractor shall employ a DHI-certified Architectural Hardware Consultant who shall review the enclosed schedule and provide a detailed hardware submittal based on the Drawings and Specification requirements, and provisions for operation of the doors for this Project.

C. Furnish and install construction temporary hardware as required by the Contractor to secure finished units until accepted by the Owner.

D. Fire-rated openings:

1. Provide hardware for fire-rated openings in compliance with A.I.A. (NBFU) Pamphlet No. 80, NFPA Standards NO. 101, FBC-Latest Edition and UL10C. This requirement takes precedence over other requirements for such hardware. Provide only hardware that has been tested and listed by UL for the types and sizes of doors required and complies with the requirements of the door and door frame labels.

2. Where panic exit devices are required on fire-rated doors, provide supplementary marking on door UL label indicating Fire Door to be equipped with fire exit hardware and provide UL label on exit device indicating "Fire Exit Hardware". All exit doors accessing the SIDA area (Apron) shall be equipped with delayed egress panic devices and the Contractor shall coordinate all electrified hardware with the fire alarm, the Airport's security and access control system and verify compatibility and function of the door hardware.

1.2 ITEMS SPECIFIED IN OTHER SECTIONS

A. Hardware for the following items is specified as a part of the items in their respective Specification Sections or in the Base Building Specifications.

1. Glass and Glazing-Section.
2. Automatic Doors
3. Folding partitions
4. Rough Carpentry.
5. Access Panels.
6. Division 16 for Electrical, Fire Alarm interface, and access control requirements.

1.3 SUPPLIER

A. Finish Hardware shall be furnished by a hardware contractor/supplier approved by the Architect as having appropriate technical knowledge and experience to correctly interpret drawings and specifications. Supplier shall be prepared at all times during the progress of installation to promptly provide competent and efficient DHI-certified Architectural Hardware Consultant, “AHC”, to approve its complete installation in order that all items shall be installed in the best manner and function properly. This will necessitate a job visit to certify the hardware installation prior to final inspection. The Contractor/Supplier shall be bona-fide direct distributor of all material furnished.

1.4 TYPE AND QUALITY

A. For purposes of designating type and quality of work of this Section, specifications are based on products of companies named. Products of other manufacturers may be approved if submitted for consideration, in accordance with Section 01600 – Materials and Equipment prior to bid date and approved by Addendum.

1.5 DELIVERY

A. All items of Finish Hardware shall be delivered to the project site, or as otherwise specified or required, and shall be checked in for completeness and familiarization with the Contractor. All items of Finish Hardware shall be packaged, numbered, labeled to identify each opening for which it is intended, and to correspond with item numbers on the approved Hardware Schedule.

1.6 INSTALLATION

A. All Finish Hardware to be installed on or in metal doors and/or frames shall be manufactured to template. Template machine screws shall be furnished for all such materials. This supplier shall furnish Hardware Schedule as approved by the Architect and all necessary templates to metal door and frame fabricators for their coordination use.

B. Coordinate with the General Contractor and the security access control contractor the location of required conduits and electrical devices required for the operation and function of electrical hardware components, including but not limited to power for transformers, electric locks, magnetic hold open devices, delayed egress at secured doors with panic devices and security system hardware.

1.7 SCHEDULES AND SUBMITTALS

A. Submit six (6) complete typewritten Hardware Schedules to the Architect and Owner for acceptance. After acceptance, provide required number of copies of accepted Hardware Schedule for distribution. No factory order shall be placed for materials until acceptance has been given by the Architect.

B. Two current copies of catalog cuts shall be submitted with the Hardware Schedule for each item of the Hardware listed in the Schedule.

C. Each item in the Schedule shall be identified on the first page of the Schedule by the manufacturer's name.

D. Submit a separate detailed keying schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

E. Provide sample lever sets for installation and verification of required clearances and mounting heights on panelized doors, or doors with applied trim.

F. Provide door hardware manufacturer's written certification at completion of the project, and certification that doors meet FBC ADA compliance.

1.8 RESPONSIBILITY

A. It shall be the Contractor/Supplier's responsibility to furnish Hardware in accordance with the intent of this Specification. Where, by virtue of Architectural design or by function, a change is necessary, Hardware of equal design and quality shall be furnished upon written approval of the Architect and Owner.

B. All Hardware shall meet the requirements of applicable codes. i.e. Underwriters Laboratory, International Building Code, and the local Fire Marshall.

1.9 TEMPLATES

A. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1. After hardware schedule has been approved, furnish templates required by manufacturing contractors for making proper provisions in their work for accurate fitting and finishing hardware setting. Furnish templates in ample time to facilitate progress of work.

1.10 QUALITY ASSURANCE

A. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.

1. Require supplier to meet with Owner to finalize keying requirements and to obtain final instructions in writing.

B. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction.

C. Door undercuts & Thresholds: Verify door undercut requirements and clearance heights for thresholds or finished floor elevations, and compliance with door rating requirements, as approved by the local Fire Marshall.

1.11 WARRANTY

A. In addition to the Manufacturer's warranty on all products and finishes on products specified in the Section, the Contractor/Supplier shall provide a warranty against defects in installation and workmanship for a period of (1) one year from the date of substantial completion of the building.

B. Provide the following manufacturers written warranty:

1. Locks & Latches: Three 3 years.

2. Closers: Ten (10) years.

3. Exits Devices: Three (3) years.

C. Refer to Division 01 Project Closeout Section for additional and detail requirements.

1.12 LOCATIONS

A. Hardware locations and maximum dimensions shall be as follows:
Distance from finish floor to center line of:

Door Knob	38" (96.5 cm)
Door Pull	42" (107 cm)
Deadlock	45" (114 cm)
Exit Bolt Cross Bar	38" (96.5 cm)
Push Plate	50" (127 cm)
Butt Hinges	Bottom Hinge - Finish floor to bottom of hinge 10" (25.4 cm). Top Hinge - Head rabbet to top of hinge 5" (12.7 cm).

Center Hinge - equal distance between top and bottom hinges.

B. Hardware locations shall be confirmed on panelized and trimmed doors. Verify that the levers will clear projected trim or moldings, and that the mounting heights will comply with FBC and Accessibility requirements.

1.13 180 DEGREE OPENINGS

A. Other than those doors that are restricted to less than 180 degree opening by building or by overhead holders or stops, all butts and/or closer arms shall be of sufficient size to allow full 180 degree opening of doors.

1.14 PRODUCT HANDLING

A. Tag each item or package separately with identification related to final hardware schedule and include basic installation instructions with each item or package.

B. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule.

C. Provide secure lock-up for door hardware delivered to the Project. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. To the greatest extent possible, obtain each kind of hardware from only one manufacturer.

B. All numbers and symbols used herein have been taken from the current catalogues of the following manufacturers.

PRODUCT	ACCEPTABLE MANUFACTURER	ACCEPTABLE SUBSTITUTE
1) Hinges	Ives	Stanley, Bommer
2) Locks & Latches	Stanley/Best	N/A As approved by Architect
3) Door Closers	LCN	Falcon, Norton, Rixson
4) Exit Device	Von Duprin	None
5) Wall Stops/Floor Stops, Flushbolts	Ives	Burns,Trimco
6) Kick Plates	Ives	Burns, Trimco

7) Threshold/Weather-strip Zero National Guard, Pemko
8) Silencers Ives Trimco, Rockwood
9) Wall mounted mag locks Security Door Controls or approved equal

C. If material manufactured by other than that specified or listed herewith as an equal, is to be bid upon, permission must be requested from the Architect prior to bidding in accordance with Section 01600 – Materials and Equipment. If substitution is allowed, it will be so noted by addendum.

2.1 BUTT HINGES

A. Doors 1-3/4" (4.4 cm) over 3'- 6" (1.07 m) in width and doors designated as high frequency (see Door Schedule) extra heavy weight (4) ball bearing 5" (12.7 cm) high.

B. Doors 1-3/4" (4.4 cm) thick - minimum 4" (10.2 cm) high.

C. Doors 1-3/8" (3.49 cm) thick - minimum 3-1/2" (10.2 cm) high.

D. Each door shall have not less than three hinges. Doors 7'-6" (2.29 m) and higher shall have four hinges whether specified under items or not.

E. All exterior out-swinging doors to have non-removable pins except where modified in the Hardware Schedule.

F. All butts used with door closers shall be ball bearing. All exterior doors shall have ball bearing butts, except as otherwise specified.

G. All exterior doors shall have stainless steel hinges.

2.2 LOCKSETS/DEADLOCKS

A. Shall be the following manufacturer and shall be furnished in the function as specified in the Hardware Sets. Products shall be provided as specified, substitutions will be considered in accordance with provisions of the Substitutions and Product Options Section in Division 01.

1. Locksets shall be Stanley/Best AK Series (Heavy Duty Locks/Levers) with interchangeable core for quick re-keying and customized master keying with 626AM – Satin Chrome with antimicrobial finish and the lever type shall match the existing building standard. Cylinder lock cores shall be Stanley/Best High Security Series 7 Pin Cores to match the Airport Facility Standard.

B. All levers, escutcheons and cylinders shall be the product of the manufacturer. Levers shall comply with required FBC Accessibility requirements.

C. Lockset latch bolt throw 3/4" (1.27 cm).

D. Electric Strikes and Locks (Where required for secured or access-controlled doors):

1. Provide electrically controlled locks and transformers where card reader or secured doors are indicated on the Drawings, scheduled, or required as part of Building security requirements, and shall be compatible with the Airport's access control system.

2. Locks shall be provided by Stanley/Best or approved equal.

3. Coordinate control with swipe card or proximity readers provided by Owner's security contractor.

4. Verify voltage provided to mag locks will not cause damage to the lock or failure to operate or overheating.

5. All electrically locked doors shall be provided with a pushbutton release for emergency egress, on the secured side of the door; power supply and transformers shall be furnished and installed for operation of all electric door locks specified or scheduled. Electric magnetic locks shall be compatible with the Airport's security system.

6. All exterior doors to have lock guards.

2.3 EXIT DEVICES

A. All devices shall be rim or vertical rod in type and function as specified. Devices must be listed under "Panic Hardware" in accident equipment of Underwriters Laboratories. All labeled doors with "Fire Hardware" must have labels attached and be in strict accordance with Underwriters Laboratories. Pulls and dummy trim shall be lever type. Panic devices shall be equipped with a 15 second delay at doors accessing secured areas and shall be coordinated and compatible with the Airport's security system.

Manufacturer	Series
Von Duprin	99

2.4 DOOR CLOSERS

A. Closers shall be one of the following manufacturers or approved equal and shall be furnished in the manufacturer's recommended printed size for the specified condition unless otherwise noted in the Hardware Sets. Closers shall be full rack and pinion complete with back check. Springs shall be motor clock type. Furnish flush mount transom brackets where no transom bar exists. Furnish parallel arm where required. Closers shall be required on all rated doors; spring hinges shall not be allowed, unless approved by the Architect. Sentronic series closers shall be tied to the fire alarm and shall automatically release the door in the event of a fire alarm and shall be 120V powered and shall be provided with a metal cover for custom finishing.

Manufacturer	Series

LCN 4041 and 4040 series (SEL)
Stanley QDC 100

B. Furnish door closers with proper arms and/or brackets to avoid conflict with door lites and/or low ceiling reveals.

C. Door closer cylinders shall be of high strength cast iron construction to provide low wear operating capabilities of internal parts throughout the life of the installation. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory.

D. Door closers shall utilize temperature stable fluid capable of withstanding temperature ranges of 120 degrees Fahrenheit to -30 degrees Fahrenheit, without requiring seasonal adjustment of closer speed to properly close the door. Closers for fire-rated doors shall be provided with temperature stabilizing fluid that complies with the standards FBC (latest Authority Having Jurisdiction accepted edition) and UL 10C.

E. Door closers shall incorporate tamper resistant non-critical screw valves of V-slot design to reduce possible clogging from particles within the closer. Closers shall have separate and independent screw valve adjustments for latch speed, general speed, and hydraulic back check; Back check shall be properly located so as to effectively slow the swing of the door at a minimum of 10 degrees in advance of the dead stop location to protect the door frame and hardware from damage. Pressure relief valves (PRV) are not acceptable.

F. All fire-rated doors shall receive automatic door closers.

G. Closers shall be mounted such that the closer unit and arm are concealed and not visible from finished common/public areas. Confirm and coordinate with the Architect on the location of closers, prior to initiating installation and frame hardware prep.

2.5 DOOR TRIM

A. All push plates, pulls, pull plates, kick plates and/or armor plates shall be any one of the following manufacturer's products or approved equal in catalog number as set forth herein.

Manufacturer	Push Plate	Pull Plate	Kick Plate
Rockwood	70C	125 x 70C	Custom Stainless Steel

B. Stainless steel plate material shall be minimum .050 gauge thick.

C. Provide stainless steel kick plates where scheduled or directed by the Architect at high impact doors and where door finishes will be damaged by carts or high usage. Kick plates to be 10 inches (254 mm) high; or fit to the bottom rail of the door type scheduled.

2.6 SILENCERS

A. All interior wood and metal door frames shall have door silencers Type 64 or 65, three per single door, two per pair of doors.

2.7 STOPS, HOLDERS, AND LOCK GUARDS

A. Stops shall be of the following manufacturers or approved equal:

1. Ives.

2. Rockwood.

3. Glynn-Johnson.

4. Rixson

B. Provide magnetic hold open devices at all rated doors schedule to remain in an open position, where shown or scheduled in the Drawings. Hold open device hardware shall be fully concealed and not visible on the public side of the door, when in an open position.

C. Doorstops shall be furnished for all doors to prevent damage to doors or hardware from striking adjacent walls or fixtures. Wall bumpers equal to Ives WS407 Series are preferred, but where not practical furnish floor stops equal to Ives FS436 or FS438 series. Where conditions prohibit the use of either wall or floor type stops, furnish surface mounted overhead stops equal to Glynn Johnson, 450 Series. Heavy duty floor stops shall be provided at exterior doors.

D. Lock guards shall be provided at all exterior doors.

2.8 THRESHOLDS AND DOOR STRIPPING PRODUCTS

A. Thresholds, where scheduled or required for thermal performance enhancement of an exterior door opening, shall be of the following manufacturer's or approved equal. See Hardware Schedule for types required.

1. Zero Weatherstripping Co., Inc.

2. Pemko Manufacturing Co.

3. Reese Enterprises, Inc.

4. Hager.

5. National Guard.

B. Thresholds shall be low profile, ADA compliant type thresholds throughout. Metal thresholds shall not be provided at stone or tile floors in Areas, thresholds for these

locations shall be stone or marble, where thresholds are required or shown on the Drawings. Exterior door thresholds shall be set in a full bed of sealant.

C. Provide sound rated hardware consisting of door sweeps, thresholds (or auto door bottoms) and concealed door bottom gaskets at base of all sound rated doors where shown or scheduled on the Drawings.

1) At frames, surface-applied-self-adhesive sound gaskets shall be equal to Pemko – S88, Black, or approved equal.

2) Provide concealed-sound-rated auto-door-bottoms, Pemko- 434 RL, or approved equal at sound rated doors.

2.9 KEYING

A. All locks shall be master keyed as directed by the Architect or Owner. Submit a proposed keying schedule for approval. Furnish six (6) master keys and two (2) keys for each lock. All locks shall be construction keyed. Furnish four (4) construction master keys. Keys shall be mastered keyed to the Airport Building Standard.

1. Hardware supplier to provide temporary cylinders or cores during the construction phase and or construction keyed cylinders as scheduled. The contractor is to change out the temporary cylinders for the permanent cylinders.
2. Coordinate keying with the Airport where applicable.

2.10 FASTENINGS

A. All screws shall be of matching finish to their product and shall be the manufacturer's standard for that item.

B. Sex Bolts - Door closers, door holders, and exit devices installed on wood doors shall be attached by means of the bolts and sex nuts.

2.11 KEY CABINET

A. Furnish a key cabinet complete with accessories to accommodate all keys.

Manufacturer	Model No.
Telkee	AWC-250-S

B. Prepare and furnish the Owner with complete index of keys as directed by the Architect. Tag and file all keys in cabinet location as directed by the Architect. Hardware supplier shall deliver keys, index lists, and cabinet, set-up and assembled to the jobsite.

2.12 FINISHES

A. Where not specifically called out in the Finishing Manuals, for all non-public access areas and exterior doors, provide hardware items in finish US32D Stainless Steel in, or as indicated below.

1.	Butts – Exterior	Match door lever
2.	Butts - Interior	Match door lever
3.	Locks	Match door lever
4.	Push/Pulls, Kickplates, Lock Guards	Match door lever
5.	Closers	Match door frame or Spray painted to match hardware per Architect's approval.
6.	Door Stops & Miscellaneous	Match door lever
7.	Exit Devices	Match door frame

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of surface protections with finishing work specified in the Division 9 Sections. Do not install surface mounted items until finishes have been completed on the substrate.

B. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

C. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

D. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly as intended for the application made.

E. Instruct Owner's personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.

F. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Division 7 Section "Joint

Protection,"

H. Weather-stripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.2 ADJUSTING AND CLEANING

A. Contractor shall adjust all hardware in strict compliance with manufacturer's instructions. Prior to turning over the project to Owner, Contractor shall clean and make any final adjustments to the finish hardware.

B. Hardware locations shall be as recommended by the Door Hardware Institute, 4 copies of the brochure shall be forwarded to the General Contractor.

C. Closer adjustment: A representative of the closer manufacturer shall visit jobsite, adjust and regulate all closers and inspect to see that they are installed according to factory recommendations and Florida Building Code (ADA) requirements and shall provide written certification of compliance.

D. Manufacturer's or Architectural Hardware Consultant's certification letter of project requirements shall be provided at the completion of the project.

E. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.

F. Clean adjacent surfaces soiled by hardware installation.

3.3 PROTECTION

A. Contractor shall protect hardware as it is stored on construction site in a covered and dry place.

B. Contractor shall protect exposed hardware installed on doors during the construction phase.

3.4 HARDWARE SCHEDULE

A. Submit required Hardware Schedule per Article 1.8 of this Section.

B. Change-out all temporary construction key cylinders once the locked space has been finished, and all construction work has been completed and accepted by the Owner and the Architect.

4.0 HARDWARE SETS:

A. The following schedule is furnished for whatever assistance it may afford the Contractor; do not consider it as entirely inclusive. Should any particular door or item be omitted in any scheduled hardware group, provide door or item with hardware same as required for similar purposes. Quantities listed are for each pair of doors or for each single door. The Contractor shall verify the function, operation, and compatibility of all electrified hardware with the Owner's security access control and the fire alarm systems.

B. Manufacturer index:

ACC = Accurate Lock	SCH = Schlage Lock
FRA = Frascio International	STA = Stanley
FSB = FSB USA	VON = Von Duprin
GLY= Glynn-Johnson	ZER = Zero International
IVE = Ives	LAR = Length As Required
LCN = LCN Closers	LDW = Less Door Width
PEM = Pemko	SDC = Security Door Controls
RIX = Rixson	
B/O = By Door Manufacturer	

* NOTE: All levers to be antimicrobial "AM"

Hardware Group No. 01

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CYLINDER	AS REQUIRED BALANCE OF HARDWARE BY DOOR MANUFACTURER CARD READER – By Owner	626	SCH

Emergency egress push button to release lock

PRESENTATION OF VALID CREDENTIAL TO CARD READER ACTIVATES AUTOMATIC DOOR

Hardware Group No. 02

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD EPT	628	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL+-HH-3547A-NL-OP-388-338	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	MAGNETIC LOCK	M490P ATS/LED	628	SCE

1	EA	LONG DOOR PULL	9264 72" 56" STD	630	IVE
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4021 DEL	689	LCN
1	EA	THRESHOLD	65A MSLA-10	AL	ZER
1	EA	POWER SUPPLY	PS904 900-4R-FA	LGR	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	LGR	VON
1	EA	LOCKGUARD	LG1	630	IVES
			CARD READER – By Owner		

Balance of Door Hardware to be supplied by Aluminum Door Supplier 08410
Card reader both sides to unlock panic hardware/then unlock magnetic lock/both sides
Wiring Diagram by Hardware Supplier
Card reader to unlock electric lock by security supplier
Emergency egress push button to release lock
Panic device delayed 15 seconds when door is locked.

PRESENTATION OF VALID CREDENTIAL TO CARD READER UNLOCKS DOOR

Hardware Group No. 03

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080P 06A	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	LOCK GUARD	LG1	630	IVE
1	EA	RAIN DRIP	141AA	AA	ZER
1	EA	THRESHOLD	65A-MSLA-10	A	ZER
3	EA	GASKETING	328AA	AA	ZER

Hardware Group No. 04

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070P 06A	626	SCH
1	EA	DUMMY LEVER			
1	EA	RIM HOUSING	20-079	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
2	EA	MANUAL FLUSH BOLT	FB458	605	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	OH STOP	450S	630	GLY
1	EA	MEETING STILES (IN ACTIVE DOOR)	381	A	ZER

Hardware Group No. 05

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050P 06A	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 06

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	EU MORTISE LOCK	L9092PEU 06A RX	626	SCH
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS902	LGR	SCE
1	EA	SURFACE CLOSER (W/HOLD OPEN)	4040SEL-24V	689	LCN
1	EA	POWER SUPPLY	4040SEL-3210	689	LCN
3	EA	SILENCER	SR64	GRY	IVE
			CARD READER-By Owner		

Card reader to unlock electric lock, Occupancy sensor or swipe to unlock door on non-secure side.

PRESENTATION OF VALID CREDENTIAL TO CARD READER UNLOCKS DOOR

Hardware Group No. 07

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD EPT	628	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL+-HH-98-L-06	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	MAGNETIC LOCK	M490P ATS/LED	628	SCE
1	EA	SURFACE CLOSER	4040XP CUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E	630	IVE
1	EA	THRESHOLD	65A MSLA-10	AL	ZER
1	EA	POWER SUPPLY	PS904 900-4R-FA	LGR	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	LGR	VON
1	EA	LOCK GUARD	LG1	630	IVES
			CARD READER-By Owner		

Card reader both sides to unlock panic hardware/then unlock magnetic lock/both sides
Wiring Diagram by Hardware Supplier
Card reader to unlock electric lock by security supplier
Emergency egress push button to release lock
Panic device delayed 15 seconds when door is locked.

PRESENTATION OF VALID CREDENTIAL TO CARD READER UNLOCKS DOOR

Hardware Group No. 08

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080P 06A	626	SCH
1	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 09

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	EU MORTISE LOCK	L9092PEU 06A RX	626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA	689	LCN
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS902	LGR	SCE
3	EA	SILENCER	SR64	GRY	IVE
			CARD READER – By Owner		

Card reader to unlock electric lock, Occupancy sensor or swipe to unlock door on non-secure side.

PRESENTATION OF VALID CREDENTIAL TO CARD READER UNLOCKS LOCKSET.

Hardware Group No. 10

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY LOCK	L9040 06A L583-363	626	SCH
1	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 11

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	L9010 06A	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No.12

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8302 10" 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	4040XP RW/PA	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group N0.13

Provide each SL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CYLINDER	AS REQUIRED BALANCE OF HARDWARE BY DOOR MANUFACTURER	626	SCH

Refer to Alternate number 5 for barn door; provide door pulls and overhead track for barn doors, in lieu of door hardware for glass door, if Alternate is accepted.

Hardware Group No. 14

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
2	EA	BIPARTING DOOR TRACK (w/FASCIA)	BP250N-02-XX	15	STA
4	EA	HANGAR SETS	BO25ON-HDW	15	STA
4	EA	DOOR PULL	B250-63	15	STA
5	EA	CENTER TRACK STOP	B250-77	AA	STA
2	EA	FLUSH BOLTS (AT INACTIVE PANELS)	FB458	605	IVE
2	EA	FLOOR GUIDES	BP150-75	WHITE	STA
1	EA	WALL STOP	WS406/407CCV	630	IVE

Hardware Group No. 15

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	L9010 06A	626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA	689	LCN
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	SOUND GASKETING	S88	GRY	PEM
1	EA	AUTO BOTTOM	360 AA LS-36-W/Z49	AA	ZER

Hardware Group No. 16

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458	605	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	L9080P 06A	626	SCH
2	EA	OH STOP	450S	630	GLY
1	EA	COORDINATOR	COR52, WFL20 FILLER	628	IVES

ASTRAGL BY DOOR SUPPLIER

Hardware Group No. 17

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458	605	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	L9080P 06A	626	SCH
2	EA	OH STOP	450S	630	GLY
1	EA	COORDINATOR	COR52, WFL20 FILLER	628	IVES
1	EA	SOUND GASKETING	S88	GRY	PEM
2	EA	AUTO DOOR BOTTOM	361	AA	ZER

ASTRAGL BY DOOR SUPPLIER

END OF SECTION 08710

SECTION 08800 – INTERIOR GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes interior glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Doors with glazing where scheduled or shown.

B. Related Sections:

1. Division 8 Section "Aluminum Entrances, Window Walls and Exterior Glazing" for exterior glazing.

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

1.4 ACTION SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.1 INFORMATIONAL SUBMITTALS

A. Product Certificates: For glass and glazing products, from manufacturer.

1.2 QUALITY ASSURANCE

A. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

B. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F, and the fire-resistance rating in minutes.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

1.5 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

B. Strength: Where float glass is indicated, provide annealed float glass, fully tempered, Kind FT heat-treated float glass.

C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
2. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

A. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
2. For uncoated glass, comply with requirements for Condition A.
3. For coated vision glass, comply with requirements for Condition C (other coated glass).

B. Tempered Patterned Glass: ASTM C 1048, Kind FT (fully tempered), Type II, Class 1 (clear), Form 3; Quality-Q6, Finish F1 (patterned one side).

1. Basis-of-Design Product: Subject to compliance with requirements, provide pattern, frosted, or fluted glass as scheduled or comparable product by one of the following:

a. Guardian Industries
b. Pilkington Glass
c. PPG Industries

2.3 FIRE-PROTECTION-RATED GLAZING

A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 for door assemblies and NFPA 257 for window assemblies.

2.4 GLAZING GASKETS

A. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene, EPDM or silicone gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

B. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

2.5 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Acid-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Dow Corning Corporation; 999-A.
b. GE Advanced Materials - Silicones; Contractors SCS1000 Construction SCS1200.
c. Tremco Incorporated; Proglaze Tremsil 200.
d. BASF Building Systems; OmniPlus.

C. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other

glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.7 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

2.8 MONOLITHIC-GLASS TYPES

A. Refer to door schedule for glass type, pattern, rating, and clear glass. All glass in doors and side lights adjacent to doors shall be tempered glass.

B. Glass Type GL-CLR: Clear fully tempered float glass (where scheduled or shown on the drawings).

1. Thickness: 6.0 mm.
2. Provide safety glazing labeling.

C. Glass Type GL-Plate Fluted – Shall be Tempered patterned glass, where shown or scheduled.

2.9 FIRE-PROTECTION-RATED GLAZING TYPES AT RATED DOORS

A. Glass Type GL-FG: 20-minute coordinated with the rating of the wall or door installed and fire-rated glazing with 450 deg F temperature rise limitation; laminated glass with intumescent interlayers at fire rated doors with ratings or located within rated walls.

1. Provide safety glazing labeling.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when

installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.5 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.6 LOCK-STRIP GASKET GLAZING

A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system unless otherwise indicated.

3.7 CLEANING AND PROTECTION

A. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

B. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

C. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

D. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08800

SECTION 08905 – ALUMINUM ENTRANCES, WINDOW WALLS AND EXTERIOR GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Description of the Work:

1. Furnishing and installation of aluminum-framed entrances, exterior aluminum windows and/or window walls and exterior glazing for the conditions outlined by the Drawings or requirements of the specifications.

2. Provide labor, materials, equipment and related items as shown on Drawings and as specified. Provide items not specifically mentioned but necessary to complete the work, including, but not limited to:

a. Anchorage to building structure, including the bracing to the primary building structure where required to provide support for forces imposed by work of this section, furnishing of embeds (where required) for installation by General Contractor based on the layout drawing furnished by the glass and glazing Installer/subcontractor.

b. Special fabrication and reinforcing of segmented framing, sills and sub-sill flashing, where shown or required.

d. Sealants within work of this section and at boundaries with work of other sections.

e. All products proposed for the project shall have a Notice of Acceptance (NOA) certification, or FBC product approval approved by the State of Florida, in accordance with the local AHJ-Authority Having Jurisdiction requirements. Furnish complete NOA (or FBC product approval) certification package with Test Reports with preliminary proposal. NOA's (or FBC product approval) certifications will be required for all windows and storefront elements shown on the Drawings prior to approval for fabrication.

f. Glass visual mock-ups.

g. Field quality control tests.

1.3 RELATED SECTIONS

A. Coordinate work of this Section with work of other Sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other Sections, including:

1. Division 3 Section “Cast-In-Place Concrete.”

2. Division 4 Section “Unit Masonry Assemblies.”

2. Division 7 Section “Caulking and Sealants.”

3. Division 8 Section “Sliding Automatic Entrance Doors.”

4. Division 8 Section “Interior Glazing.”

5. Division 9 Section “Gypsum Board Assemblies.”

1.4 REFERENCES

A. Except as otherwise specified, comply with:

1. Aluminum Association (AA)

a. Aluminum Design Manual.

b. Aluminum Standards and Data.

2. American Institute of Steel Construction (AISC)

a. M-016 Manual of Steel Construction Allowable Stress Design, Ninth Edition.

3. American Iron and Steel Institute (AISI)

a. Specification for the Design of Cold-Formed Steel Structural Members.

b. Stainless Steel Cold-Formed Structural Design Manual.

4. American Society of Civil Engineers (ASCE)

a. ANSI/ASCE-8 Specification for the Design of Cold-Formed Stainless Steel Structural Members.

5. American Welding Society (AWS)

a. D1.1 Structural Welding Code--Steel.

6. American Concrete Institute (ACI)

a. Building Code Requirements for Reinforced Concrete (ACI 318)

7. American National Standards Institute (ANSI)

a. ANSI Z97.1 Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings

b. ANSI/SMA 1004 Specifications for Aluminum Tubular Frame Screens for Windows.

8. Glass Marketing Association of North America (GANA) Glazing Manual.

9. General Services Administration

a. GSA Specification TT-P-645B for Alkyd Type Zinc Chromate Primer Paint.

b. FS-RR-W-365 Federal Specification Wire Fabric (Insect Screening).

10. American Architectural Manufacturers Association (AAMA)

a. AAMA/NWWDA 101/I.S.2 Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors.

b. AAMA 501.1 Standard Test Method for Exterior Windows, Curtain Walls and Doors for Water Penetration Using Dynamic Pressure.

c. AAMA 502 Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage.

d. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum.

e. AAMA 2604 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels for powder coatings, where provided.

f. AAMA 2605 Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels for Kynar coatings, where provided.

g. AAMA TIR-A9 Metal Curtain Wall Fasteners.

11. ASTM International (ASTM)

a. A 36 Specification for Carbon Structural Steel.

b. A 123 Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

c. A 500 Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

d. A 501 Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

e. A 653 Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

g. B 244 Test Method for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments.

h. C 509 Specification for Elastomeric Cellular Preformed Gasket and Sealing Material

i. C 794 Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.

j. C 864 Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.

k. C 1036 Specification for Flat Glass.

l. C 1048 Specification for Heat-Treated Glass--Kind HS, Kind FT Coated and Uncoated Glass.

m. C 1087 Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.

n. C 1115 Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories.

o. C1172 Standard Specification for laminated Architectural Flat Glass

p. C 1248 Test Method for Staining of Porous Substances by Joint Sealants.

q. C 1376 Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Glass

r. C 1521 Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.

s. D 2244 Test Method for Calculation of Color Differences From Instrumentally Measured Color Coordinates.

t. D 4214 Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.

u. E 283 Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

v. E 330 Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

w. E 331 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

x. E 987 Standard Test Methods for De-glazing Force of Fenestration Products.

y. E 1300 Standard Practice for Determining Load Resistance of Glass in Buildings.

12. Florida Building Code - Current Edition in effect - Test Protocols for High Velocity Hurricane Zones

13. Comply with the Florida Building Code –Current Edition in effect, NFPA 101 - Current Edition in effect and Florida Accessibility Code - Current Edition and or where required by this Section, exceed the Code. Nothing in this Section shall be construed as allowing or requiring noncompliance with Code.

14. Insulating glass certification council (IGCC) CBA.

1.5 SUBMITTALS

A. Submit drawings and product data under provisions of Section 01300 and as further described in this section.

B. **Preliminary Submittal:** Submittals for information only, shall be as described below. Upon request, promptly submit additional information and clarification of intent.

1. Submit paint manufacturer's approval of paint applicator, as required for warranty.

2. Complete NOA (or FBC product approval) certifications including fastener requirements and technical data provided or required for window system approval by State of Florida, for all assemblies indicated or shown on the Drawings.

3. Proposed paint manufacturer's warranty for coating system.

4. Sealant system technical data sheet proposed for the project.

5. Provide written statement of full compliance with the Drawings and Specifications. If deviations are proposed, provide an itemized list of specification and architectural drawing requirements which are not embodied in contract, or intended contract, for work of this section. Identify specification

page and paragraph, or architectural drawing sheet, elevation, plan, section or detail for each item. Deviations not specifically identified shall not be deemed valid in submittal review. Failure to provide either a statement of full compliance or an itemized list of deviations shall, at reviewers' discretion, shall be cause for return of preliminary submittals without review. Where NOA (Notice of Approval) lists more than one option, indicate clearly on the preliminary submittal which option is proposed for use on the project.

6. Written certification from the glass and aluminum manufactures that materials that are being provided are manufactured and fabricated domestically, within the United States.

D. **Shop Drawing Submittals:** Submittals for approval, submittals shall be complete and in required form. Resubmittals shall include requested corrections and shall respond to previous comments. Each revised sheet shall bear a revision date and number. Revisions shall be flagged with conspicuous revision symbols and numbers. Failure of submittals to be complete, in the proper form, responsive to comments, or identify revisions shall be cause for disapproval and return of documents without review. Failure of review comments to note a noncompliance with plans and specifications shall not relieve the Contractor from his obligation to comply.

1. Failure of review comments to note a noncompliance on a given submittal shall not preclude a directive to comply on future submittals. A maximum of two reviews will be performed without additional cost to the Contractor. If a submittal does not achieve an approved status by the second submittal, cost of additional reviews by Architect and Consultant shall be borne by Contractor

2. Submit drawings showing materials in place on building. Drawings shall include elevations, floor plans, sections and full size details. Details shall be fully drawn (not outlined). Drawings shall include the following information.

   a. Identify those products which, by Code, are subject to “impact” testing requirements or are required to have Product-Notice of Approval. and/or Product Label.

   b. Joinery and internal seals (details showing sill flashing, head receptors, sill and mullion intersections with details of sealing) as required for special conditions of window wall assembly.

   c. Identify products (by name and manufacturer) and provide details for any required thermal insulation and/or safing insulation.

   d. Metal alloy, temper, thickness, and finish.

   e. Glass thickness, strength, tint, and coating.

   f. Fastener alloy, strength, plating, diameter, length and spacing.

   g. Glazing materials identification

h. Sealant identification by product name.

i. Dimensions of the window wall assembly, relative to the layout of adjoining walls, beams, columns and slabs.

j. Dimensioned position of glass edge relative to metal daylight.

k. Provisions for movements and for internal reinforcement, where required

l. Locations of, and details for, embedded anchors

m. Location, manufacturer's part #, and samples or manufacturer's cut sheets for all hardware, thresholds and locking devices.

n. Weld information and weld symbols conforming to AWS conventions.

o. Glazing details applicable to replacement glass, with outline of procedure for glass replacement, to be provided as part of closeout documents.

p. Anchor details, showing provisions for adjustment of anchors to accommodate specified building structure tolerances..

q. Sample of coating manufacture’s specific project warranty certification and approval of applicator.

3. Submit glass manufacture's wind pressure analysis, thermal stress analysis, and manufacture's written review of shop drawings stating that details including glass products are suitable for the proposed use, including Code required “impact” resistance, glass bite, support clearances, air circulation on interior and consideration of the effects of exterior shading

4. Submit sealant manufacture's test reports confirming sealant adhesion, compatibility and absence of staining of adjacent materials. Submit application and quality control procedures for sealants.

5. Submit laboratory test reports for thermal tests performed in accordance with AAMA 1503.

6. When NOA (or FBC product approval) certifications are not available for a window assembly as a part of the preliminary submittal requirements outlined in this specification, or NOA (or FBC product approval) certification testing is in progress and not yet complete submit structural calculations to demonstrate that the assembly shall ultimately comply with FBC / and NOA requirements, prior to fabrication. Submit structural calculations prepared by a State of Florida licensed Structural Engineer in conformance with referenced documents and this section. Calculations shall be legible and shall incorporate sufficient cross references to shop drawings to make calculations understandable and readily reviewable. These structural calculations shall not waive the FBC requirements to provide product testing and NOA compliant

assemblies scheduled to be installed. **THE MANUFACTURER SHALL BE SOLELY RESPONSIBLE FOR ENSURING THAT THE WINDOW ASSEMBLIES MEET OR EXCEED THE FBC-NOA** (or FBC product approval) **COMPLIANCE PRODUCT REQUIREMENTS, IF FABRICATION IS INITIATED PRIOR TO NOA** (or FBC product approval) **TESTING IS COMPLETED.** Test reports are not an acceptable substitute for calculations. Calculations shall include:

a. Analysis of framing members, including provisions for thermal and building movements.

b. Analysis of anchors, including anchors embedded in concrete

c. Section property computations for framing members

d. Seal and signature of professional engineer registered in the state of Florida, with certification of compliance with specified performance criteria.

7. Submit record drawings as part of contract close-out documents, showing all changes made during construction.

8. Submit written certification from the installing contractor that hardware and door operating pressures comply with FBC accessibility code requirements for door operation.

E. Samples:

1. Submit for approval four (4) sets of labeled samples of each type and color of metal finish, on 12 inch long sections of extrusion shapes and 12 inch squares of sheet metal. Samples shall show extremes of color and texture variation. Samples will be reviewed by the Architect for color and texture only. Compliance with other requirements is the responsibility of the Contractor.

2. Submit for approval four (4) sets of labeled 12 inch square samples of each type of glass. Provide, at project, site visual mock-up using full size glass, for evaluation of color range and distortion of reflected image.

1.6 QUALIFICATIONS

A. Aluminum Fabricator: Company specializing in fabrication of architectural aluminum extrusions and sheet with satisfactory completion of similar work and of adequate financial responsibility. Engineer providing structural design shall be licensed in the State the work is to be completed and have experience designing architectural aluminum.

B. Glass Supplier and Fabricator: Company specializing in manufacture of flat glass and fabrication of architectural glass.

C. Gasket Supplier: Company specializing in manufacture of products specified in this section.

D. Sealant Supplier: Company specializing in manufacture of products specified in this section.

E. Installer: Company specializing in performing work of this section.

1.7 DESIGN REQUIREMENTS

A. Contract Documents define design intent and performance requirements. Details show intended relationships and preferred profiles. Contractor shall develop and provide final design details and shall be fully responsible for the conformance of the installed work to the design criteria herein.

B. Unless otherwise defined by Contract Documents, appearance of exposed elements, including width and depth, shall be consistent throughout the project for similar or like window opening conditions and/or configurations.

C. Unless otherwise defined by Contract Documents, overall thickness of each glass type, and component thickness of multiple layer glass types, shall be consistent throughout the project for similar or like conditions.

. D. Provide anchor adjustment capability for full range of specified tolerances for building structure, but not less than one inch in all directions, or dimensional requirements to accommodate construction tolerances of concrete and masonry openings in accordance with the Specifications.

E. Design wind pressures shall be in compliance with Authority Having Jurisdiction wind pressure maps, FBC, and the Structural Drawings. Block diagrams are shown on the Structural Drawings.

F. Wind pressures act perpendicular to flat surfaces, regardless of surface orientation. Wind pressures act perpendicular to tangents of curved surfaces. At corners and other changes in plane, either the inward pressure or the outward pressure shall be assumed to affect the two adjoining surfaces simultaneously. Design for simultaneous occurrence of inward pressure on one surface and outward pressure on adjoining surface is not required.

G. Structural elements of the work shall meet the requirements of applicable state and local codes and the requirements of rule 16B33.007 of the Department of Environmental Protection, State of Florida.

H. Structural Design Method:

1. Structural engineering, where required, shall be completed by a licensed Engineer, registered in the State of Florida, and calculations shall be completed in accordance with standard engineering practices, consistent with the requirements of the Florida Building Code (FBC) and FBC-NOA (or FBC product approval) certification.

I. Framing Members:

1. Glass, sealants and interior finishes shall not be assumed to contribute to framing member strength, stiffness or lateral stability.

2. Compression flanges of flexural members may be assumed to receive effective lateral bracing only from (a) anchors to building structure and (b) horizontal glazing rails or interior trim which contact the compression flange. Points of contra-flexure shall not be regarded as lateral braces or as end points of an unbraced length; unbraced length shall be the distance between effective lateral braces.

3. Where a framing member reaction is resisted by a continuous element, maximum assumed effective length of resisting element shall be four times the bearing length, but not more than one foot.

4. Splice joints permitting movement shall be assumed to have zero moment capacity.

5. Where a framing member runs continuously past a deflecting support, combined deflection of member and support shall not exceed specified limits.

6. Thermal breaks are not required and, if provided, shall be assumed to have no ability to transfer shear stress for composite action of flexural members (elements joined by a thermal break shall be assumed to act separately).

J. Fasteners

1. General Requirements

a. Quantity, spacing and length of fasteners shall be designed and engineered by the window wall manufacturer for specific jamb, head and sill conditions consistent with the NOA certification, approved by the State of Florida, and wind loading criteria as shown on the structural drawings.

b. Tension shall be taken as sum of direct tension plus tension due to prying.

c. Penetrations of a shim stack with total thickness "t" by a fastener with nominal diameter "d" shall require reductions in allowable tension and shear forces. Minimum reduction shall be zero percent for t=d, varying linearly to 100 percent for t=2d. Such reduction shall be in addition to any other reductions which may be applicable. An acceptable alternative method is to assume that shims provide no resistance to fastener bending, compute fastener bending stress with cross sectional properties based on root diameter, add bending stress to tension stress, and evaluate tension/shear interaction. Allowable stress for bending shall be the same as allowable stress for tension per standard engineering analysis or by an FBC approved NOA certification.

d. Unless otherwise specified, combined tension and shear shall be evaluated according to an interaction formula in which each term equals the square of actual force divided by the square of allowable force. Sum of terms shall not exceed 1.0.

2. Allowable stresses for aluminum fasteners shall comply with Aluminum Design Manual.

K. Glass:

1. Wind pressure shall be treated as short duration load and gravity loads shall be treated as long term load, as defined by ASTM E 1300.

2. Probability of breakage upon first application of design pressures shall not exceed 8/1000 for vertical glass, and 1/1000 for sloped and horizontal glass. Glass strength and size shall conform to code and ASTM E 1300.

3. Provide heat treated glass where annealed glass would be vulnerable to thermal breakage.

4. Spandrel glass units where shown or indicated on the Drawings to comply with adjacent glazing criteria. Color and tint to match adjacent glazing; tint color shall be bronze or color as selected by the Architect from full range of glass colors. Spandrel glasss will not be an acceptable substitute for frosted glass, where shown or required by the contract documents.

L. System shall be designed to support its own weight in combination with other specified pressures and loads.

M. Movements:

1. Provide movable joints (specific and defined provisions acceptable to the Architect), where required, to accommodate all specified building movements, as well as manufacturing tolerance, field tolerance, irregularities in adjacent surfaces, thermal movement, wind sway, floor sag, beam sag and column shortening. Except where otherwise specifically defined by the Structural Engineer, the design allowance for differential beam and/or floor edge sag, live load floor deflection and creep shall be not less than 0.5 inch.

   The manufacturer shall confirm with the Building Structural Engineer the live load deflection criteria, before submitting the shop drawings for approval.

2. Theoretical and as-built glass bite relative to metal frame shall not be less than 0.375 inch and theoretical and as-built glass edge clearance to nearest metal shall not be less than 0.25 inch. Provide minimum 3/16 inch face clearance (glass-to-metal).

3. Thermal component of joint movement shall be based on minimum material temperature increase of 100 degrees F and decrease of 60 degrees F relative to nominal condition. Assume entire cross section has uniform temperature.

Design summer surface temperature is 180 degrees F. All components including adhesives and sealants shall be capable of withstanding without failure design temperatures with simultaneous specified loads.

4. At any floor, in-plane displacement shall be assumed to occur while floors immediately above and below remain stationary. There shall be no failure or gross permanent distortion of anchors, frames, glass, or stone; gaskets and weatherstrips shall not disengage; weather seals shall not fail.

N. Systems which rely upon a single line of defense against water infiltration are not acceptable. Provide integral or secondary gutters and weep systems inboard of the primary line of weather-seal to collect and drain water leakage to the exterior. Window walls, and windows which are internally drained to the sill utilizing integral weeping sill, shall have continuous (permanently spliced and sealed) sill flashing gutters with water-tight, fully sealed (from front to back) to the adjacent building structure at all terminal conditions (or provided with fully sealed metal end caps) and shall have a head rail which collects and contains infiltration at each glazed opening, drained, either directly to exterior or, in a contained and concealed manner, within the system to the flashed and externally drained sill gutter.

Segmented (curved in plan) areas of the work require specific attention to assure both adequate provision for the specified movements and long term provision for the water-tight performance of the segmented wall mullions, heads, sills and their splice details.

Glazing details shall permit glass replacement after initial construction, shall permit reuse of original gaskets, shall permit replacement glass of same nominal size as original glass, and shall not require cutting of framing members or removal of interior finishes.

O. Vision glass exterior, and spandrel glass shall be replaceable from the exterior.

P. Snap engaged or slide on components shall be mechanically secured against migration. Snap engaged components shall not serve any primary structural function, such as retention of glass or panels. Snap engaged plastic components are not permitted, except as nonstructural thermal improvement for interior trim. Joints in continuous snap covers and other continuous trim shall have splice sleeves of same material and finish as cover or trim and the locations of all such joints shall be clearly shown on the shop drawings.

1.8 PERFORMANCE REQUIREMENTS

A. Structural Criteria:

1. At pressures and loads from zero to 150 percent of design values:

a. Framing member residual deflection after pressure or load is removed shall not exceed 1/1000 times distance between supports or 2/1000 times cantilever length.

b. At anchors, framing member deflection relative to building structure shall not exceed 0.187 inch, nor 0.125 inch after pressure or load is removed.

c. Upon reversal of pressure or load direction, relative movement between two components that are fastened or clamped together shall not exceed 0.187 inch.

d. There shall be no disengagement, failure or significant permanent distortion of any component, including glass and gaskets.

2. At 100 percent of design pressures and loads :

a. Unless otherwise stated by code, net deflection perpendicular to enclosure surface for framing members supporting glass or metal panels shall not exceed: L/180 pursuant to Florida Building Code.

b. Net deflection of framing members parallel to enclosure surface shall not exceed smallest of: 0.125 inch due to dead load; 0.125 inch change in opening size at any point; 1/360 times distance between supports, not to exceed 0.375 inch.

c. Net deflection parallel and perpendicular to enclosure surface for framing members at perimeter sealant joints shall not exceed smallest of values specified above; 50 percent of joint width; movement capacity of sealant.

d. Where applicable, metal panel center deflection shall not exceed 1/100 of the shorter panel dimension.

B. Sealants used as weather seals shall not experience adhesive or cohesive failure. Sealants shall withstand movements up to the limits prescribed by manufacturers. Exposed sealant surface shall not crack or bubble. Sealant and primers shall not stain adjacent materials. Sealants shall be used only if manufacturers' adhesion, compatibility and stain tests yield favorable results. Sealants shall not be placed against edge of laminated glass interlayer

C. Glass:

1. Glass shall not experience spontaneous breakage.

2. Glass coating shall not crack, peel, stain or discolor.

3. Glass center deflection relative to supported glass edges at 50 percent of specified design pressures shall not exceed one inch. Glass deflection at 1.5 times design pressures shall be limited to prevent disengagement from frame, unless the deflection criteria may be reduced by FBC approved NOA (or FBC product approval) certification of the assembly.

4. Laminated glass shall not delaminate, stain or discolor.

5. Glass shall comply with all window wall assembly NOA certification and

FBC requirements.

D. Snap engaged components shall not disengage when subjected to a concentrated force of 10 pounds or during mock-up structural tests.

E. Window Systems

1. U factor < 0.45; SHGC <= 0.25.

1.9 PRODUCT TESTING

A. At all exterior building envelope conditions, as mandated by Florida Building Code, pay all costs and make all necessary arrangements for Small and/or Large Missile Impact Testing, related detailing, testing, or other actions as may be required to obtain current Product Approval for NOA (or FBC product approval) certification, as required and approved by the State of Florida, and/or Product Labeling from the agencies having authority.

1. Submit complete documentation verifying current Product- Notice of Approval (NOA) (or FBC product approval) certification, for all such products proposed for use on this building.

B. Refer to Part 3 of this specification for requirements for field testing of the assembly. Payment for labor and materials shall not exceed the limitations outlined in division one, unless quality assurance testing has been satisfactorily completed, at the time payment request is submitted.

C. Glass Visual Mock-ups:

1. Prior to ordering glass, the Contractor shall provide, glass samples a minimum of 12 inch x 12 inch. Provide production thickness, tint, coating and heat treatment.

2. Owner and Architect shall inspect glass samples for acceptability, as evidenced by color, color consistency, match and appearance of reflected image. If acceptable, glass samples shall be retained as an acceptance standard for production material. If not acceptable, provide additional samples for inspection until acceptable color and appearance is obtained

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver fabricated units and component parts to project site completely identified in accordance with erection diagrams prepared by this contractor.

B. Store materials in accordance with manufacturer's instruction, above grade on dunnage, properly protected from the weather and construction activities and so located as to facilitate access to, and handling of, all materials, and in accordance

with Section 01600 – Materials and Equipment and Section 01620 – Storage and Protection.

C. Replace all damaged materials.

1.11 SEQUENCING

A. Coordinate with requirements of material and personnel hoists. Defer installation at obstructed areas, and install materials when obstructions are removed.

1.12 WARRANTY

A. Provide written warranty agreeing to repair or replace defective materials and workmanship during warranty period. Defective materials and workmanship include, but are not limited to:

1. Abnormal deterioration, aging or weathering.

2. Water leakage.

3. Air leakage exceeding specified limits.

4. Failure of operating parts to function normally.

5. Structural failure.

6. Sealant loss of adhesion, loss of cohesion, cracking or discoloration.

7. Disengagement of gaskets, weatherstrips, trim or other accessories

8. Deterioration or discoloration of aluminum finish.

9. Glass breakage including: secondary breakage caused by falling glass; spontaneous breakage of heat treated glass.

10. Delamination or discoloration of laminated glass.

11. Loss of glass bite due to shifting of glass.

12. Loss of glass bearing on setting blocks due to shifting of glass and/or blocks.

B. Warranty does not include damage caused by vandalism, or by natural conditions exceeding the performance requirements. Warranty and its enforcement shall not deprive Owner of other action, right or remedy.

C. Warranty period for entire system shall be three (3) years from date of substantial completion, unless otherwise noted; i.e. paint finish warranty. System warranty includes materials and labor.

D. Certain materials are required to have special warranties. Special warranties shall not limit or reduce requirements of system warranty. Special warranties may originate, in part or in whole, with manufacturers or fabricators and pass through Contractor to Owner. Warranties as written or interpreted by manufacturers or fabricators shall not limit or reduce special warranty requirements of this specification.

1. Painted finish on aluminum which cracks, peels, fades in excess of specified limits or chalks in excess of specified limits shall be replaced at no charge (material and labor) for minimum ten (10) year period beginning on date of manufacture. Coating manufacture shall provide written confirmation of applicator approval prior to initiation of fabrication.

2. The paint manufacturer shall provide written approval of the paint applicator and ten (10) year warranty; prior to initiation of any fabrication work.

3. Laminated glass which delaminates shall be replaced at no charge (materials and labor) for a minimum five (5) year period beginning on date of manufacture.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel:

1. Hot rolled shapes and plates shall conform to ASTM A 36.

2. Tubing shall conform to ASTM A 500 or A 501.

3. Stainless steel bars and sheet shall be AISI Type 302 or 304 and/or consistent with an FBC approved NOA (or FBC product approval) certification. Minimum thickness is: 0.062 inch for frames; 0.031 inch for trim covers; 0.012 inch for concealed flashing.

4. Non tubular cold formed carbon steel with thickness 0.168 inch or less shall conform to ASTM A 653.

B. Aluminum:

1. Acceptable alloy and temper combinations for extrusions subject to fabrication, finish and structural requirements are: 6063-T5; 6063-T6; 6061-T6. Other alloys of the 6xxx series and other tempers may be submitted for approval. Nominal wall thickness of 0.125 inch or greater is acceptable for structural extrusions; wall thickness less than 0.125 inch may be acceptable and is subject to approval. Minimum nominal wall thickness for nonstructural interior trim shall be 0.062 inch.

2. Acceptable alloy and temper combinations for sheet and plate subject to fabrication, finish and structural requirements are: 3003-H14; 5005-H14.

Other alloys of the 3xxx, 5xxx and 6xxx series and other tempers may be submitted for approval. Minimum nominal thickness is 0.04 inch for flashings and 0.125 inch for all other applications.

C. Glass:

1. For consistency of quality, appearance and performance throughout the work, glass materials shall be the product of a single manufacturer or fabricator for each kind or condition of product indicated, and shall be composed of primary glass from a single source.

2. Glass shall conform, as a minimum, to the following standards.

   a. Flat glass shall conform to ASTM C 1036, quality q3

   b. Heat-treated flat glass shall conform to ASTM C 1048, except that surface compression of heat strengthened glass shall be 3500 to 8500 PSI.

   c. Tempered and laminated glass shall conform to ANSI Z97.1.

   d. Laminated glass shall conform to ASTM C 1172.

3. Provide safety glass at the following locations.

   a. Doors.

   b. Fixed and operable glazing where nearest exposed edge of glazing is within a 24 inch arc of either vertical edge of the door in a closed position and where exposed bottom edge of glazing is less than 60 inches above walking surface.

   c. Fixed glazing and operable glazing with exposed area exceeding 9 square feet, with exposed bottom edge less than 18 inches above a walking surface, exposed top edge more than 36 inches above walking surface, with a walking surface within 36 inches horizontally of glazing; Safety glass is not required if there is a protective bar with minimum 1.5 inch width located between 34 and 38 inches above walking surface on accessible side of glazing, with bar capable of supporting a horizontal load of 50 pounds per linear foot without contacting glass.

   d. Additional locations required by code.

4. Provide heat strengthened glass where required by design pressures, anticipated thermal stress, or use in spandrel area. Provide fully tempered glass only where safety glass is mandatory or where design pressures exceed capacity of heat strengthened glass.

5. Glass Edge Quality:

   a. Annealed Face Glass:

(1) Shark teeth shall not penetrate more than half of glass thickness.

(2) Serration hackle shall not penetrate more than 10 percent of glass thickness.

(3) Flare shall not exceed 0.062 inch as measured perpendicular to glass surface across edge.

(4) Bevel shall not exceed 0.062 inch.

(5) Flake chip depth shall not exceed 0.031inch and length or diameter shall not exceed 0.25 inch.

(6) Rough chips are not permitted. Rough chips are those which exceed dimensional limits for flake chips.

b. Heat treated face glass shall have seamed edges, free from shark teeth, serration hackle, flare and chips.

6. Laminated glass shall consist of two layers of heat strengthened glass of equal thickness and DuPont Butacite or Solutia Saflex interlayer of thickness required, but not less than 0.060 inch nominal thickness.

7. In addition to conforming to ASTM C 1048, heat treated glass shall conform to the following flatness tolerances.

a. Bow and warp are defined as deviation of a glass surface from a true plane, with glass free-standing or installed in a frame and positioned in a vertical plane.

b. Localized bow refers to any straight line segment on a glass surface with length of 12 inches.

c. Overall bow refers to any straight line segment on a glass surface which extends between opposite edges and is perpendicular to at least one edge. Length of line segment is gage length.

d. Localized bow shall not exceed 0.0625 inch.

e. Overall bow shall not exceed: 0.041 inch per foot for gage length zero to 36 inches; 0.031 inch per foot for gage length 36 to 60 inches; one half of the values listed in ASTM C 1048, Table 2 for gage lengths exceeding 60 inches.

f. Where heat treating results in parallel ripples or waves, maximum peak-to-valley deviation shall not exceed 0.005 inch. Requirements for localized bow and overall bow shall also be satisfied. Direction of ripples shall be consistent throughout building and shall be parallel to the glass width edge.

g. Specified bow and ripple tolerances are intended as manufacturing quality control limits and are subject to acceptance of the glass visual mockup, if provided

h. During the manufacture and the fabrication of glass for this project, heat treated glass shall be subjected to those quality control measures recommended by the glass manufacturer to identify and to minimize inclusions within the glass which could result in spontaneous breakage. Inclusions causing spontaneous breakage are defined as material defects by this specification. Heat treated glass which experiences spontaneous breakage after installation shall be replaced (material and labor) under the provisions of the warranty for this project.

8. Insulating glass shall have double edge seals. Primary seal shall be extruded polyisobutylene continuously bonded to glass surface and to dessicant filled metal spacer, including corners. Minimum width of the primary seal shall be 0.125 inches. Secondary seal shall be silicone (GE/GS 3725 or Dow Corning 982). Secondary seal shall completely cover spacer without gaps or voids and shall be continuously bonded to both plates of glass. The insulating glass units shall have been tested in accordance with ASTM E774, and compliance with classes C, B and A shall be indicated by a permanent label (visible after installation) with a minimum height of 0.05 inches. All muffins shall be aluminum and internal to insulated glazing units; refer to drawings for muffin locations and patterns.

9. Glass types, except where otherwise mandated by Code, shall be as follows:

<u>Type #1</u> (Within 30 ft or less – of Grade)

At window walls, windows, and doors (where insulated glass is available for impact rated assemblies or other areas requiring Code - compliant large and small missile impact testing shall be glazed with, insulating laminated assemblies (of thickness required, but not less than 1-5/16 inch), made up of:

1/4 inch (minimum) match PPG Azuri at outer light, with Solarban 70XL on #2 surface
1/2 inch airspace
1/4 inch Clear H/S
.090 Interlayer per FPA/NOA
1/4 Inch Clear H/S

All lights to be heat strengthened (exterior monolithic light to be safety tempered, where code required)
(Provide 9/16” tempered laminated glass to match insulated glass at doors if insulated glass is not available for design wind loading).

D. Glazing System:

1. Window glazing system shall, at the option of the Contractor, be:

a. Option #1, a dense gasket against one face and a cellular gasket against the other glass face.

b. Option #2, a dense gasket against the interior glass face and a recessed compatible spacer with a continuous silicone cap seal against the exterior face.

2. At locations which are, by Code, subject to impact resistance criteria and testing, provide a continuous interior cap bead of silicone, or other method as may be approved, to assure the retention of glass within the framed opening.

3. All low “E” coatings shall adhere to glass surfaces in order to ensure that edge deletion does not occur for the life of the glass assembly.

4. All glass will be manufactured and fabricated domestically, unless written approval is given by the Owner and the Architect as part of the preliminary product approval.

E. Elastomeric Gaskets, Weatherstrips and Blocks:

1. Gaskets and weatherstrips:

a. Cellular gaskets shall be extruded black neoprene or EPDM with a hardness of 40 +/- 5 durometer Shore A and conforming to ASTM C509, flame propagation test not required. Design cellular gaskets to provide 20 to 35% compression.

b. Dense gaskets shall be black extrusions (neoprene, EPDM or silicone) with a Shore A hardness of 75 +/- 5 for hollow profiles and 60 +/- 5 for solid profiles, and conforming to ASTM C1115, Type C or to ASTM C 864.

c. Injection mold corners of all exterior gaskets unless shown to be incompatible with the installation procedures.

d. Gaskets shall be designed to produce glass edge pressure of 4 to 10 pounds per linear inch.

e. All gaskets shall be UV resistant.

2. Silicone gaskets and sheet, where used to absorb movements at framing expansion joints, shall conform to ASTM C 1115, Type T

3. Gaskets and weatherstrips shall have a continuous spline or a continuous groove engages a matching groove or leg on the aluminum frame

4. Setting Blocks:

   a. Setting blocks shall be dense extruded neoprene, silicone or EPDM with hardness of 85 +/- 5 durometer Shore A, minimum length of 4 inches and minimum width corresponding to glass thickness. Setting blocks shall be equidistant from glass centerline (location of setting blocks at quarter points is acceptable). Distance from vertical glass edge to nearest edge of setting block shall not be less than six inches (or 0.125 times glass width, whichever is greater). **PVC setting blocks will not be acceptable.**

   b. Shims used in conjunction with setting blocks shall be of the same material, hardness, length and width as the blocks.

   c. Setting blocks and chairs shall be secured against migration.

5. Side Blocks:

   a. Provide side blocks at both jambs, between mid-height and top corner of glass. Blocks shall be 55 +/- durometer Shore A dense neoprene, silicone or EPDM. Block width shall be 0.125 inch less than nominal glass edge clearance.

   b. Side blocks are not required where glass is continuously sealed with silicone at two or more edges

F. Anchors in Concrete and Masonry:

1. Anchors embedded in concrete and masonry shall be prime painted rolled steel, or hot dip galvanized cold formed steel.

2. Strength of embedded anchors shall be developed by integral projections, welded deformed bars, or headed studs.

3. At masonry, through bolts are acceptable provided that bearing plates are used at both masonry surfaces. Expansion bolts are acceptable provided they are designed for use in masonry.

4. Expansion bolts are acceptable at concrete.

5. Self drilling, self threading screws are not acceptable. Screws in plugs and powder actuated fasteners are not acceptable.

G. Fasteners:

1. Fastener requirements are applicable to screws, bolts, nuts, washers, rivets and pins.

2. Fasteners shall comply with FBC approved NOA certification and cut-sheets or documentation shall be provided to Architect.

3. Stainless steel fasteners (alloy type 302 or 304 only), or aluminum fasteners if acceptable to manufacturer, are required at the following locations, and are acceptable at all locations:

   a. Locations with exposure to outdoor air

   b. Joinery of aluminum frames, regardless of exposure

   c. Glazing pockets

   d. Internal cavities that act as gutters, or that may potentially contain water resulting from leakage or condensation

4. Carbon steel fasteners with zinc plating or cadmium plating are acceptable at other locations; with silicone sealant encapsulation at locations where fasteners will be subject to corrosion if primary sealant joint fails, and when approved in writing by the Architect and the Owner.

5. Provide lock washer or other locking device at all bolted connections.

6. Powder actuated fasteners are not acceptable.

H. Shims:

1. At connections subject to movement, separate moving surfaces with friction reducing pads. Pads shall have minimum 0.062 inch thickness, shall sufficiently reduce friction to permit movement, shall be resistant to wear, and shall be positively retained in position (open ended slots are not acceptable). Pads shall not be subjected to heat damage from welding or cutting, or to excessive pressure from overtightening of bolts.

2. Shims which transfer shear forces (tending to slide one shim against another) shall be steel plates, set in a staggered pattern and fillet welded to each other and to adjacent steel surfaces. Shims and welds shall be structurally designed to support applied loads.

3. Plastic shims are acceptable at static connections for which shims transfer only compressive forces.

4. Wood shims are not acceptable.

I. Weep hole filters shall be 20 to 45 pore per inch PVC coated open cell urethane foam.

J. Sealants:

1. Acceptable products (subject to tests) for seals to substrates other than stone are: Dow Corning 790, 795 and 995. A primary and secondary perimeter seal shall be provided at the jamb, head end sill of framed assemblies abutting masonry or concrete surfaces.

2. Data sheets for and samples of other sealants may be submitted for approval. Oil base sealants are not acceptable.

3. Sealant back-up materials shall be closed cell, non-gassing and non-absorptive. Acceptable materials include: polyethylene foam, urethane foam or extruded silicone as recommended by sealant manufacturer. Back-up shall not absorb water.

4. Coordinate with other sections to assure compatibility of intersecting sealants, and that porous or stone materials shall not be stained.

K. Primers:

1. Coat aluminum surfaces in contact with masonry, concrete or unpainted steel with prime paint (non-wetted only) or bituminous paint (wetted areas) where required.

2. Prime paint steel parts of anchors, embedded anchors, exposed reinforcement and supports. After field welding, remove weld slag and touch up primed surface.

3. Provide minimum dry film thickness of one mil for paint and 30 mils for bituminous paint. Prime paint shall conform to GSA specification TT-P-645. Bituminous paint shall conform to SSPC-Paint 12.

L. Product Source:

1. Solely for the purpose of designating type and quality for the work described in this section, drawing details and specifications are based upon the products of YKK AP America or approved equal. Upon written request and submission of preliminary submittal requirements, alternate products will be reviewed for acceptance by the Architect.

2. For consistency of quality, appearance and performance throughout the work on window walls, windows, and operating hardware shall be the product of a single manufacturer or fabricator for each kind or condition of product indicated.

M. Window Wall Framing:

1. Where required to comply with structural design criteria, aluminum framing shall be YKK AP 50FI Impact Resistant Storefront System with insulated glass or approved equal, including product(s) by Sun Metal Systems, PGT, Inc., EFCO Corporation; a Pella Company, fitted to receive glass types shown and specified. It shall be adapted to the adjacent building construction and shall be anchored and reinforced as required to withstand specified impact and design wind loads.

2. Segmented aluminum framing shall be YKK AP America YHS 50 FI or approved equal, including product(s) by Sun Metal Systems, PGT, Inc., EFCO Corporation; a Pella Company, or YKK AP America, modified to suit hardware and glazing conditions shown and shall be provided with full length spliced and sealed flashed sill, installed and sealed water-tight to the adjacent building structure prior to the installation of framing and glazing work and shall be anchored and reinforced as required to withstand specified design wind loads. All Fixed systems shall have FPA/NOA extruded sill pan.

N. Windows: Fixed windows shall be YKK AP America 50 FI (non-thermal) or approved equal, including product(s) by PGT, Inc., EFCO Corporation; a Pella Company.

1. Comply with Glazing System requirements

2. Required test specimen size is largest size for this project, not the size required by AAMA/NWDA 101/1.S.2.

3. Locks and strikes shall be type 302 or 304 stainless steel or white bronze. Provide, at a minimum, cam locks with handles and strikes per vent, in compliance with NOA certification and FBC approvals.

4. Vent frames shall be extruded tubular aluminum not less than 2 inches in depth. Tube perimeter shall be continuous aluminum and shall not be interrupted by a thermal break.

5. Weather strips shall have a continuous spline engaged in a continuous groove in the frame.

6. Balance arms shall be four-bar stainless steel type 302 or 304 with adjustable friction shoe. Provide two balance arms per vent.

7. Provide two limit stops per vent. Material shall be 302 or 304 stainless steel. Stops shall restrict clear opening to four inches and shall provide for deactivation by the Building Custodian to allow screen removal/installation

O. Entrance Doors: Glazed entrance doors for manual-swing operation shall be YKK AP American 50H Entrances or approved equal, including products by PGT, Inc., EFCO Corporation; a Pella Company.

1. Door Construction: Monumental; 2-1/4-inch overall thickness, with minimum 0.125-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
2. Door Design: As indicated Wide stile; 5-inch nominal width.

a. Bottom Rail with weatherstrip; 10-inch nominal height.
b. Accessible Doors: Smooth surface for width of door in area within 10 inches above floor or ground plane.

3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.

    a. Provide nonremovable glazing stops on outside of door.

P. Entrance Door Hardware:

1. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door to comply with requirements in this Section. The door hardware shall be provided in accordance with the manufacturer's Florida Product Approval testing criteria or provided with an Engineered Assessment Report per the Florida Building Code.

    a. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated.
    b. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
    c. Opening-Force Requirements:

        1) Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion and not more than 15 lbf to open the door to its minimum required width.
        2) Accessible Interior Doors: Not more than 5 lbf to fully open door.

2. Opening-Force Requirements:

    a. Latches and Exit Devices: Not more than 15 lbf required to release latch.

3. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305, as specified in Division 8 Section "Door Hardware."
4. Cylinders: As specified in Division 8 Section "Door Hardware."
5. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing. Electric Access controls with CVR's shall be provided at doors scheduled to be "secured" or electrically access controlled.
6. Weather Stripping: Manufacturer's standard replaceable components.

    a. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.

7. Silencers: BHMA A 156.16, Grade 1.

Q. Accessory Materials:

1. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 7 "Caulking and Sealants."

2. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil thickness per coat.

R. Concealed Flashing:

1. Acceptable materials are neoprene or silicone (type “T” only) sheet, stainless steel sheet and mill finish aluminum sheet. Minimum thickness for flashing is 0.062 inch for neoprene or silicone, 0.012 inch for stainless steel, and 0.040 inch for aluminum. Aluminum, where in contact with dissimilar materials, is required to have a bituminous coating.
2. Provide sealed interior glass stops, flashing adapters, and gutters with sealed lap joints, end dams and transitions or fully welded joints where required to assure control and drainage of infiltration to gutters.

2.2 FABRICATION

A. As far as practicable, fabrication, glazing and assembly shall be completed in the shop.

B. Exposed work shall be carefully matched to produce continuity of line and design. Joints in exposed work, unless otherwise shown or specified, shall be accurately fitted and rigidly secured. Remove burrs from cut edges. Ease corners and edges.

C. Except where otherwise shown, specified or directed, method of assembly and joining shall be at manufacturer's discretion as shown on the approved shop drawings.

D. Welding shall be in accordance with recommendations of the American Welding Society and shall be done with electrodes and by methods recommended by suppliers of alloys being welded. Welds behind finished surfaces shall be done as to minimize distortion and/or discoloration on finished side. Weld spatter and welding oxides on finished surfaces shall be removed by descaling and/or grinding.

E. Unless otherwise shown or specified, weld beads on exposed surfaces shall be ground and finished to match and blend with finish on adjacent metal. Grinding and polishing of nonferrous metal shall be done only with clean wheels and compounds free from iron and iron compounds. Soldering and/or brazing are not acceptable.

F. Provide exposed fasteners only where shown on approved shop drawings. Exposed fasteners shall be countersunk. Fastener heads shall be finished to match fastened material and shall be sealed or gasketed as required to prevent water entry.

G. Provide specified finishes on exposed surfaces. Provide specified galvanized finish on all concealed carbon steel parts or reinforcements potentially exposed to water infiltration.

H. Sealant work performed in the shop shall be done in strict conformance with the sealant manufacturer's written instructions. Excess sealant in visible areas shall be cleaned off immediately upon completion of assembly work and prior to shipment.

I. Aluminum-Framed Entrances:

1. Form or extrude aluminum shapes before finishing.
2. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld splatter and welding oxides from exposed surfaces by descaling or grinding.
3. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

    a. Profiles that are sharp, straight, and free of defects or deformations.
    b. Accurately fitted joints with ends coped or mitered.
    c. Means to drain water passing joints, condensation within framing members, and moisture migrating within the systems to exterior.
    d. Physical and thermal isolation of glazing from framing members.
    e. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
    f. Provisions for field replacement of glazing.
    g. Fasteners, anchors, and connection devices that are concealed from view to greatest extend possible.

4. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
5. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
6. Storefront Framing: Fabricate components for assembly using head-and-sill-receptor system with shear blocks at intermediate horizontal members.
7. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

    a. At exterior doors, provide compression weather stripping at fixed stops.
    b. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

8. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

    a. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
    b. At exterior doors, provide weather sweeps applied to door bottoms.

9. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

10. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

J. Aluminum Sun Shades:

1. Basis of Design
   a. Curtain Wall System: YKK AP ThermaShade® Aluminum Sun Shade System, or Architect approved equal.
2. Sun Shade System:
   a. Description: All structural components and attachment hardware shall be concealed.
   b. Thermally improved anchor: Sunshade anchor must provide a continuous thermal barrier by means of a poured and debridged pocket consisting of a two-part, chemically curing high density polyurethane which is bonded to the aluminum. Anchors employing non-structural thermal barriers are not acceptable.
   c. Style: Wedge Outrigger with wedge fascia, with 6’ airfoils, with concealed anchors, 30-inch projection with internal subframe integral with the store front system.
3. **MATERIALS**
   a. Extrusions: ASTM B 221 (ASTM B 221M), 6063-T5 and 6063-T6 Aluminum Alloys.
4. Manufacturer’s Standard Accessories:
   a. Fasteners: AISI 300 series stainless steel fasteners.
5. Shop Assembly: Fabricate and assemble units with joints only at intersection of aluminum members with hairline joints; rigidly secured, in accordance with manufacturer’s recommendations.
6. Finish to Match Storefront

2.3 TOLERANCES

A. Tolerances in current edition of Aluminum Association "Aluminum Standards and Data" are applicable to finished, fabricated and assembled materials, except that flatness tolerance for aluminum sheet panels shall be half of standard sheet tolerance. Maintain stricter tolerances where required for proper fit of components.

2.4 ALUMINUM FINISH

A. General Requirements:

1. Exposed aluminum surfaces shall be finished with a factory oven cured finish. Paint shall be supplied by a licensed formulator.

2. Application of finish shall be performed under specifications issued by licensed formulator, by an applicator specifically approved by formulator.

3. Color shall be custom color to be adonized aluminum or “Bone White or” for frames and sun shades to match Owner's sample. Samples submitted for approval shall show extremes of color range.

3. Pretreatment of metal surfaces shall be done in accordance with procedures recommended by formulator.

5. Field touch-up of painted aluminum is permitted only with written permission from the Architect. Unless such touch-up is authorized, replace damaged material with new material.

B. Outdoor Surfaces:

1. Painted aluminum finish shall be an electrostatically applied high performance powder coating complying with AAMA 2605 and based on PPG's "Kynar" coating system or approved equal.

2. Pigmented organic coatings for extrusions, structural shapes, sheet or plate, spray applied in the factory, shall meet requirements of AAMA 2605.

3. Exterior exposed aluminum surfaces shall be finished with a factory oven cured three coat (minimum) finish based on Kynar 500 or Hylar 5000 fluoropolymer resin. Formulation shall have at least 70% Kynar 500 or Hylar 5000 resin in residual solids.

4. Pigmented organic coatings for extrusions, structural shapes, sheet or plate, spray applied in the factory, shall meet the requirements of AAMA 2605 for basis of design Kynar coating system.

5. Warranty:

a. Color changes shall not exceed 5E NBS units as defined by ASTM D 2244 for the specified special warranty period.
b. Chalking shall not exceed a number 8 rating as defined by ASTM D 4214.
c. Paint film shall not crack or peel during the specified special warranty period.
d. Coating manufacture shall provide written certification that the applicator is approved in order to provide a ten (10) year warranty for the coating.
e. Anodized Finishing shall be a minimum of AAMA 612, meeting warranty of 10 years

6. Adonized Finishing: Prepare aluminum surfaces for specified finish; apply shop finish in accordance with the following:

a. of AAMA 612. Aluminum extrusions shall be produced from quality controlled billets meeting AA-6063-T5.
b. Exposed Surfaces shall be free of scratches and other serious blemishes.
c. The anodized coating shall comply with all of the requirements of AAM 612: Voluntary Specifications, mortar, salt spray, and chemicals commonly found on construction sites, and to resist the loss of color and gloss.
d. Overall coating thickness for finishes shall be a minimum of 0.7 mils.

C. Indoor Surfaces:

1. Specified finish for outdoor surfaces is acceptable for indoor surfaces.

2. Where outdoor and indoor parts can be finished separately, factory oven cured acrylic or polyester paint is acceptable for indoor surfaces.

3. Acrylic and polyester pigmented organic coatings for extrusions, structural shapes, sheet or plate, spray applied in the factory, shall meet requirements of AAMA 2604.

2.5 STEEL FINISHES

A. Cold formed carbon steel with thickness 0.168 inch or less shall be hot dip galvanized to meet or exceed requirements of classification G 90 of ASTM A 653.

B. Cold formed carbon steel with thickness exceeding 0.168 inch and hot rolled steel shall be prime painted in accordance with GSA specification TT-P-645 or hot dip galvanized in conformance with ASTM A 123

C. Concealed carbon steel reinforcement potential exposed to water infiltration shall receive hot dip galvanized finish in conformance with ASTM A123.

D. After fabrication of painted steel, all cut ends and holes shall be degreased and prime painted. Galvanized finish shall be applied after fabrication.

2.6 SOURCE QUALITY CONTROL

A. Adhesion, Compatibility and Stain Tests

1. Provide to sealant manufacturers samples of all substrates which are in contact with sealant, regardless of whether adhesion must be achieved.

2. For substrates which must support adhesion, submit for record only sealant manufacturers' reports of adhesion tests conducted in accordance with ASTM C 794. Metal screen is an acceptable substitute for airplane cloth.

3. For substrates which are in contact with sealant, submit for record only sealant manufacturers' reports of compatibility tests for sealants and primers conducted in accordance with ASTM C 1087.

B. Inspect materials and workmanship to assure compliance with Contract Documents. Provide access to storage and manufacturing facilities for observation by Owner and Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, prior to start of work, that structure and site conditions are ready to receive work of this section. Establish offset lines and bench marks as required for this purpose and for installation.

1. Verify location, alignment and position of embed anchors installed by others.

2. Verify that concrete openings into which work by this contractor is to be installed are level, square and sized to allow this work to proceed in accordance with the approved drawings installation tolerances specified herein.

3. Notify the General Contractor in writing of any openings which do not comply with requirements specified below.

3.2 INSTALLATION

A. Install materials in accordance with approved drawings. Provide labor, material, equipment and supervision necessary for complete installation.

1. Glass installation shall comply with GANA (Glass Association of North America) “Glazing Manual” except as specifically recommended otherwise by the glass manufacturer.

2. All framing joints shall be accurately and securely fitted and properly sealed for a weather-tight installation. All cut and machined ends and recesses shall be true, accurate and free of burrs and rough edges.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 7 Section “Caulking and Sealants” to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Tolerances:

1. Provide anchor adjustment capability for full range of specified tolerances for building structure.

2. Work of this section shall be within the following tolerances.

a. Deviation from plumb, level or dimensioned angle shall not exceed 0.125 inch per 12 feet of length of any member, 0.25 inch in any total run in any line.

b. Deviation from theoretical position in plan or elevation, including deviation from plumb, level or dimensioned angle, shall not exceed 0.375 inch total at any location. Change in deviation shall not exceed 0.125 inch for any 12 foot run in any direction.

c. Maximum offset from true alignment between two consecutive members placed end to end shall not exceed 0.062 inch.

d. Maximum offset between glass framing members at corners of glazing pocket shall not exceed 0.031 inch.

G. Anchorage:

1. Anchor component parts by bolting and welding. Install slip pads between moving parts in accordance with FBC - NOA certification or manufacture's requirements.

2. Provide non-corrosive separators between dissimilar materials.

3. Perform field welding in accordance with AWS standards. Prepare surfaces as specified for shop welding. Remove weld slag and apply prime paint over welds. Prime paint exposed portions of embedded anchors. Touch up shop applied primer that is damaged by welding or other causes. Do not perform welding where discoloration or other damage would result on exposed surfaces, including glass and finished metal.

4. Where slots or oversize holes are provided for adjustment only, secure connection after final adjustment. Interlocking serrations in extruded aluminum brackets and washers are acceptable. Steel weld washers with 0.25 inch minimum thickness are acceptable with steel brackets. Special washers or nuts which rely on friction and/or surface indentation of fastened part are not acceptable.

H. Internal Gutters and Drainage:

1. Seal water and air tight all interior joints between window framing members and glazing adapters or removable glass stops, in accordance with FBC - NOA (or FBC product approval) certification or manufacture's requirements.

2. Provide and install flashed sill gutters at all window walls and at windows where shown or where required by specification, or compliance with FBC - NOA (or FBC product approval) certification or manufacture's requirements. Sill gutters shall be installed with integral end dams at each jamb.

3. Flashed gutters shall be continuous for the full length of each building structure opening and fitted with permanently sealed splice joints where required. Gutter shall slope to drain to exterior and shall be closed at ends with metal closures shop welded or mechanically attached and sealed to the gutter assembly, in accordance with FBC - NOA (or FBC Product Approval) certification or manufacture's requirements.

4. End closures for the flashed sill gutters shall be fully weather sealed (front to back depth of gutter) to adjacent building structure. Weather seal shall direct all infiltration, including drainage from adjacent building elements, into the flashed sill gutter for drainage to the exterior, in accordance with FBC - NOA (or FBC product approval) certification or manufacture's requirements.

5. Remove any temporary shims and fasteners, leaving all moving joints free to accommodate building movements as designed.

I. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points:

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturer’s written instructions using concealed fasteners to greatest extent possible.

K. Install perimeter joint sealants as specified in Division 7 Section “Caulking and Sealants” to produce weathertight installation.

K. Clean surfaces to be sealed. Install backers, primers and sealant in accordance with drawings, test results and manufacturer recommendations. Tool sealants as a separate operation after application. Immediately remove masking.

3.3 GLAZING

A. Inspect frame for proper dimensions, square, freedom from obstructions within glass pockets, and proper joinery seals and drainage provisions. Adjust frame and/or glass size as required to meet specified requirements.

B. Clean glazing pocket before setting glass. Solvents shall be compatible with finished aluminum, glass and glazing materials. Setting blocks shall be provided at all lights, including doors, and shall be equidistant from glass centerline. Location of setting blocks at glass quarter points is acceptable. Distance from vertical glass edge to nearest edge of setting block shall not be less than six inches, or 0.125 times glass width, whichever is greater. Side blocks shall be located between mid-height and top corner of glass. Side blocks, setting blocks and chairs shall be positively retained in position.

C. Install gaskets with injection molded corners on exterior (and interior where practicable). Where gasket corners cannot be molded, provide excess gasket lengths as required for “crowd in” of gasket to assure permanently tight corners. Tightly butt ends of gaskets and seal all non-molded gasket corners with compatible sealant. Gasket joints shall not occur at locations other than corners.

D. Inspect glass before installation. Glass not conforming to specification shall not be installed. Replace any glass lights broken or damaged on face or edge surfaces.

E. Except as otherwise specified, comply with GANA Glazing Manual. Provide minimum nominal glass bite of 0.5 inch. Where designed joint movement will result in variable glass bite, increase nominal bite to provide not less than 0.375 inch bite and not less than 0.25 inch minimum edge clearance under full range of specified movements.

F. Remove and replace stops and apply sealants at joints as required for complete and water/air tight glass installation.

G. Coordinate sequencing of glazing with General Contractor and defer glazing of openings obstructed during construction. Glaze such openings when obstructions are removed.

3.4 FIELD QUALITY CONTROL

A. Field Check for Water Leakage:

1. Method for field check for water leakage shall be by "static pressure" box test (modified AAMA 502) at a pressure of 8 PSF. There shall be no unacceptable water leakage as defined herein. Refer to procedures outlined below for specific testing criteria.

2. The water leakage field check and sealant adhesion tests shall be monitored by an independent testing agency approved by the Architect and Owner.

3. Provide powered scaffold, hose, water supply, test enclosure, instrumentation and manpower to perform at least two successful groups of tests, plus repeat of any unsuccessful tests. The test areas shall be selected by the Architect and shall be completely representative of the intended construction, including all operating hardware, locks, handles, perimeter sealants, and surrounding construction.

4. Initial water testing shall be conducted within 1 week of start of glazing. Construction sequence shall be accelerated, where necessary, to allow for timely completion of any surrounding areas affecting the conducting of this initial test. General Contractor and Glazing Subcontractor shall advise Architect, approved testing agency, Owner, and glazing consultant in writing when installation testing shall be conducted only when a floor area of the building is completed and ready to be tested, test area shall be randomly selected from the competed work area. Scheduling of the testing shall be conducted so as to not to delay construction and within an adequate time to identify any problem area with window wall installation.

5. Remedial measures, if required as a result of these tests, shall be subject to approval prior to installation, shall be applied to all previously installed work and shall maintain the standards of quality and durability for the project. A third group of tests may be required if, in the opinion of the Architect, necessary to verify the maintenance of quality. Costs of all such tests, and remedial action (if necessary) are the responsibility of the contractor.

B. Field test for sealant adhesion: Periodically test sealants in place for adhesion, using methods recommended by sealant manufacturer. Promptly replace any sealant failing to adhere or to cure.

C. Field test for wall drainage gutter:

1. Where applicable, test the internal gutters on the initial two floors by temporarily plugging the weeps and filling the gutters with water to a depth of about 2 inches. After not less than 15 minutes, inspect the gutters for leakage.

2. Correct any deficiencies observed and retest until successful tests are achieved. If deficiencies occur, continue testing 100% of the gutters until at least one complete floor has been tested without failure.

3. Continue testing at the rate of not less than 10% of all gutters, randomly selected. If deficiencies recur, resume test program as described.

D. Field test performance criteria for assembly:

1. The Contractor and window manufacturer and/or installer shall complete the work and prepare an area of the building to be tested, which shall be a minimum of one floor level representative of the project conditions. Testing will not be conducted without written notification in accordance with Part 3 of this specification that the test area is ready for field testing from the Contractor.

2. Test Sequence:

a. Water infiltration under static pressure (10 PSF).

3. Condensation is acceptable during water infiltration tests. Water leakage is acceptable only if all of the following conditions are satisfied: (a) water is contained and drained to exterior; (b) there is no wetting of a surface that would be visible to building occupants; (c) there would be no staining or other damage to completed building or its furnishings. This definition of water leakage governs over any other definition appearing in referenced documents.

4. Where test sequence or test failure requires successive water infiltrationtests, the only means used to drain water from internal cavities shall be gravity drainage through weep system for a minimum of 15 minutes. Air pressure, removal of parts or other means of draining water shall not be used.

5. Static water infiltration test shall conform to ASTM E 331. Differential test pressure shall be 10 PSF. There shall be no unacceptable water leakage as defined herein. Sources of water leakage shall be identified.

3.5 ADJUSTMENT

A. Adjust operating components for proper fit within fixed frame.

B. Adjust weather-strips for continuous contact and seal in closed position.

C. Adjust hardware for proper operation.

D. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.

1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch, measured to the leading door edge.

3.6 MAINTENANCE - REPLACEMENT

A. Provide Owner glazing details applicable to replacement glass, with outline of procedure for glass replacement.

3.7 PROTECTION AND CLEANING

A. Protect materials against damage and contamination. Maintain installed work in reasonably clean condition and clean surfaces as required to remove dirt, stains and corrosive substances, during and at conclusion of construction.

B. Periodically remove from the site debris, excess materials and unused tools and equipment resulting from this work. At conclusion of construction, leave premises in clean condition.

END OF SECTION 08905

SECTION 09110 – METAL FURRING AND LATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes metal furring and lathing for portland cement plasterwork.

B. Furnish all labor, materials, tools, equipment, etc. and services necessary and incidental to the complete fabrication, furnishing and erection of this Section as shown, noted, detailed, necessary and reasonably implied on the drawings and in the specifications.

C. Related Sections:

1. Division 7 Section “Weather Barriers” for secondary weather/vapor barrier at framed and lath stucco assemblies.
2. Division 9 Section “Portland Cement Plaster (Stucco)” for exterior portland cement plasterwork (stucco).
3. Division 9 Section “Gypsum Board Assemblies” for interior gypsum board assemblies.
4. Division 6 Section “Miscellaneous Carpentry” for exterior sheathing.

1.3 SUBMITTALS

A. Submit product data under provisions of Division 1 Section “Submittal Procedures.”

B. Submit properly identified manufacturer's literature including material specifications for each product specified, installation recommendations and other data as may be required to show compliance with the specifications.

C. Manufacturer's certificate that materials meet specification requirements.

D. Submit Quality Assurance data per Article 1.4, this Section and Certification per Article 1.3e, this Section.

E. For furred / suspended ceiling areas subject to wind uplift, provide the following:

1. Submit shop drawings showing complete information for fabrication and installation of furred/suspended ceiling area framing. Indicate

dimensions, location, size, spacing and gauge.

2. Provide installation layout including location and details of anchorage devices to be embedded in other construction.
3. Fabricate elements to limit finish surface deflection to L:360.
4. Wind pressures act perpendicular to flat surfaces, regardless of surface orientation. Wind pressures act perpendicular to tangents of curved surfaces. At corners and changes in plane, adjacent surfaces shall be assumed to experience the worst case combination of inward pressure simultaneously, outward pressure simultaneously, and simultaneous occurrence of inward pressure on one surface and outward pressure on adjoining surface.
5. Provide manufacturers complete design calculations and shop drawings signed and sealed by a professional engineer registered in the State of Florida.

1.4 QUALITY ASSURANCE

A. This subcontractor shall have been engaged with the installation of metal furring, and performed this work in at least three (3) projects equal in scope to this work.

1.5 CODES AND STANDARDS

A. Comply with applicable requirements of governing codes and authorities.

B. Perform Work in accordance with the following standards:
1. ASTM C841 - Standard Specification for Installation of Interior Lathing and Furring.
2. ASTM C847 - Standard Specification for Metal Lath.
3. ASTM C926 - Standard Specification for Portland Cement-Based plaster (stucco).
4. ASTM C933 - Standard Specification for Welded Wire Lath.
5. ASTM C1063 - Standard Specification for Installation of Lathing and Furring for Portland Cement-Based Plaster.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Sections 01600 and 01620.

B. All materials shall be delivered and stored per manufacturer's instructions.

PART 2 - PRODUCTS

2.1 PROTECTIVE FINISHES

A. Exterior Work: Galvanize all metal lath, furring and steel studs including hangers unless otherwise shown or specified.

B. Where shown or specified to be galvanized, fabricate metal lath, furring, and

steel studs from galvanized sheet steel complying with ASTM A525. Galvanize inserts, hangers and channels by the hot-dip process in compliance with ASTM A123.

C. Materials specified by weight do not include the weight of protective finishes.

2.2 FURRING MATERIALS

A. Rolled Steel Channels:

1. Hot or cold-rolled type with a minimum weight per thousand L.F. of not less than the following: 300 lbs. for 3/4" size, 475 lbs. for 1-1/2" cold-rolled, and 1120 lbs. for 1-1/2" hot-rolled size.

2.3 ATTACHMENTS AND FASTENERS

A. Hangers:

1. Wire, of rigid steel of the type and minimum size (10 gauge) or as required to comply with the requirements of ANSI 641, ASTM C841, for the maximum ceiling areas to be supported in the work.

B. Wire Ties:

1. Soft annealed galvanized steel wire, not less than 16 gauge for tying furring channels to runner channels, and not less than 18 gauge for other ties.

C. Fasteners:

1. Fasteners shall be corrosion resistant of size, length and type as recommended by manufacturer.

2.4 METAL LATH

A. Metal lath shall be Self-furring expanded metal lath with staggered indentations spaced 3-1/2" apart horizontally and 2" apart vertically with indentations of depth to hold lath a minimum of 1/4" away from back-up material. Lath shall weigh 3.4 pounds per square yard.

B. Metal lath to be used where supports are spaced not more than 16" on centers shall be expanded metal lath and weighing 3.4 pounds per square yard. Metal lath to be used where supports are spaced over 16" on centers shall be expanded metal lath stiffened with 3/8" ribs spaced 4" on center, weighing 3.4 pounds per square yard.

C. Asphalt paper-backed metal lath shall be 3.4 pounds per square yard, diamond mesh lath factory bonded on the back with asphalt impregnated paper, conforming to Federal Specification UU-B-790a; Type 1, Grade D.

2.5 ACCESSORIES

A. For all metal and rigid PVC plaster (stucco) accessories see Section 09180 of these specifications.

B. For secondary vapor barrier (in addition to felt backed lath) provide Dupont's Tyvek commercial wrap system, or approved equal, for all framed and metal lath assemblies. Refer to Section 07250 – Weather Barriers.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. All items in this Section shall be installed by experienced skilled mechanics in the best workmanlike manner and in this trade's best standard practice, plumb, square, level, true and in strict accordance with manufacturer's printed instructions.

3.2 INSTALLATION

A. Metal Furring:

1. Provide metal furring where shown, as specified, and as required to provide support for plaster bases. Where size and spacing of furring members is not shown for support of lath, do not exceed the maximum requirements of ASTM C841 for the type of lath to be used in the work. Where control or expansion joints are shown, provide separate supports on each side of joint. Do not bridge joints with metal furring.
2. Attach metal furring channels vertically, spaced 16" o.c. to masonry or concrete surfaces with hammer-set or power driven fasteners or concrete stub nails staggered 24" o.c. on opposite flanges.

B. Suspended ceilings:

1. Provide complete engineered suspension systems, including hangers, attachments, main runners and cross-furring. Use components of the sizes and locate at the spacings required by ANSI A42.4 for the maximum ceiling areas to be supported, unless otherwise shown or specified.
2. Suspend hangers for structural supporting members or intermediate framing members only by attaching to metal clips designed for the type of member involved, or where possible by looping and wire-tying directly to members. Secure to concrete by wire-tying to cast-in-place hanger wires or hanger inserts, installed prior to placing of concrete. Advise concrete installer of specific requirements for his placement of wire hangers or inserts.
3. Provide extra hangers within 6" of end of main runners and as required to support light fixtures, ceiling diffusers and grilles, access panels and other items resting in or on the ceilings. At control or expansion joints, provide extra hangers as required to support discontinuous runners.

4. Support main runners from hangers by saddle tying wire hangers to runners, or wrapping rod hangers around runners. If flat steel hangers are used, bolt hangers to channels or bend around runner and bolt to hanger above runner, using 3/8" stove bolts.
5. Locate main runners within 6" of parallel walls to support ends of cross-furring.
6. Locate cross-furring perpendicular to main runners and not more than 2" from parallel walls. Attach to main runners at each intersection with not less than 16 gauge wire or a double strand of 18 gauge wire.
7. Do not abut runners or furring into masonry or concrete construction; allow no less than 1" clearance between such construction and ends of runners or furring.
8. Splice main runners and furring channels by overlapping (with flanges of channels interlocked) and wire tie each end of splice with not less than double loops of 16 gauge wire. Overlap not less than 12" for main runner splices and not less than 8" for cross-furring splices. Provide additional ceiling framing as required to form openings and to frame openings. Coordinate support framing with the work of other trades.
9. At control or expansion joints, provide discontinuous lap in main runners occurring over joints. Do not bridge joints with cross-furring, provide furring to support each side of joint.

C. Suspension Systems for Metal Lath Applications:

1. Provide 1-1/2" cold-rolled steel channels to comply with the applicable requirements of ASTM C841 for sizes and spacing of components used in the work, unless otherwise shown. Space 3/4" channel cross-furring not to exceed the maximum span requirements of ASTM C841 for the type and weight of metal lath to be supported in the work.

D. Metal Lath:

1. Use metal lath of the type and weight required to comply with the maximum support spacing requirements of ASTM C841 and ASTM C847 for the various applications required in the work. Provide intermediate metal furring supports to reduce distance between supports to maximum permissible spans, as required.
2. Provide self-furring lath where shown and where plaster is to be applied over solid surfaces which do not provide adequate mechanical or chemical bond.
3. Apply lath with long dimension at right angles to supports, unless otherwise specified. Where ribbed or sheet type laths are used, apply with projections against supports.
4. Attach lath to supports in accordance with the requirements of ASTM C841 for the kinds of supports shown, but do not exceed 6" o.c. spacing between attachments.
5. Lap sides of diamond mesh not less than 1/2". Nest edge ribs of ribbed lath except flat-rib lath (1/8" ribs) may be lapped 1/2" in lieu of nesting ribs. Locate all end laps over supports and lap not less than 1". Stagger end laps over different supports wherever possible. Wire tie side laps at

intervals not to exceed 9" o.c. and lace end laps occurring between supports.

6. At internal corners, butt lath at vertex of angle and reinforce with cornerite strip reinforcing. Wire the cornerite to lath along edges at not more than 12" o.c. Where diamond mesh metal lath is used, cornerite may be omitted if lath is not less than 6" down partitions/walls; at vertical internal angles, extend bent lath to not less than one support away from corner.
7. Where lath abuts load-bearing walls or partitions, structural columns, or structural decks or ceilings, terminate lath to allow for casing bead isolation joint between plaster and abutting surface.
8. Where control or expansion joints are shown, terminate lath on each side of joint. Do not bridge joints with lath.
9. Extend lath eight (8) inches minimum, across concrete block and concrete beam and concrete block and concrete column joints.
10. At corners of openings provide metal lath "Butterflies" at 45 degree angles to corners.
11. Paper-backed metal lath shall be installed at exterior frame walls, ceilings, columns and where indicated, shown or called for on the drawings. Provide second under or base layer of vapor barrier, “Tyvek” or approved equal to all framed and lath stucco assemblies.

E. Accessories: For location and installation of accessories see Section 09180.

3.3 CLEANING

A. The Contractor shall be responsible for keeping all working areas clean of his materials and kept stacked and/or stored in a neat orderly dry manner during the work.

3.4 MATERIAL AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and be replaced with new material in the best workmanlike manner at NO EXTRA COST to the Owner.

END OF SECTION 09110

SECTION 09180 - CEMENT PLASTER - STUCCO

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Furnish all labor, materials, tools, equipment, etc. and services necessary and incidental to the complete fabrication, furnishing and erection of this Section as shown, noted, detailed and reasonably implied on the drawings and in the specifications.

1.3 RELATED SECTIONS

A. Coordinate work of this Section with work of other Sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other Sections, including:

1. Division 9 Section 09110 “Metal Furring and Lathing.”

1.4 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300 – Shop Drawings, Product Data and Samples.

B. Submit properly identified manufacturer's literature including material specifications for each product specified, installation recommendations and other data as may be required to show compliance with the specifications.

C. Manufacturer's certificate that materials meet specification requirements.

D. Submit quality assurance data per Article 1.6, this Section and engineering calculations per Article 1.4 E, this Section.

E. For furred and, metal stud framed wall and ceiling, or suspended ceilings (as shown or scheduled.) areas subject to wind pressure, provide the following:

1. Submit shop drawings showing complete information for fabrication and installation of furred / suspended ceiling area framing. Indicate dimensions, location, size, spacing and gauge.

2. Provide installation layout, including stucco control joints.

3. Provide location and details of anchorage devices to be embedded in other

construction.

4. Provide manufacturer's complete design calculations and shop drawings signed and sealed by a professional engineer registered in the State of Florida, indicating compliance with the Design Criteria.

1.5 DESIGN CRITERIA

A. Comply with the Florida Building Code – Latest Edition in effect, Florida Building Code – Latest Edition in effect – Test Protocols for High Velocity Hurricane Zones, NFPA 101 – Current Edition. Nothing in this Section shall be construed as allowing or requiring noncompliance with the Code.

B. Design wind pressures, uplift loads and design wind speed shall be per the Structural Drawings.

C. Wind pressures act perpendicular to flat surfaces, regardless of surface orientation. Wind pressures act perpendicular to tangents of curved surfaces. At corners and changes in plane, adjacent surfaces shall be assumed to experience the worst case combination of inward pressure simultaneously, outward pressure simultaneously, and simultaneous occurrence of inward pressure on one surface and outward pressure on adjoining surface.

D. Design units to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

E. Design component connections to accommodate building movement and thermal movement. Provide adjustment to accommodate misalignment of structure without unit distortion or damage.

1.6 QUALITY ASSURANCE

A. Unless otherwise specified comply with applicable requirements of governing codes and authorities, ASTM C926 (Stucco) and ASTM C1063 for accessories and ASTM C841 for Metal Lath and Furring.

B. This subcontractor shall have been engaged with the installation of cement plaster work, and performed this work on at least 3 projects equal in scope to this work. Submit data in writing showing compliance with these requirements to the Architect before starting of any work. See Section 00950 - Quality Assurance.

C. Allowable tolerances: maximum deviation from true plane 1/4 inch in 10 feet as measured by straight edge placed at any location on surface. Provide Architect with lightweight straight edge for checking. Architect will pierce, puncture walls for checking thickness and this subcontractor shall patch same.

D. Comply with applicable fire resistance ratings of governing codes and authorities. In fire resistant assemblies, materials, accessories and installation procedures shall have been tested and listed by Underwriters' Laboratories, ASTM E119.

1.7 SAMPLE PANEL

A. Prior to installation of exterior cement plaster work, provide portable sample mock-up panels using materials specified for final work. Build sample panels at the site, as directed, and of full thickness and approximately 3' x 3', unless otherwise shown. Demonstrate the proposed range of color, texture and workmanship to be expected in the completed work.

B. Obtain the Owner and Architect's acceptance, in writing, of visual qualities of the sample panels before start of the cement plaster work. Retain sample panels during construction as A standard for judging completed plaster work. Do not alter, move or destroy sample panels until plastering work is completed. Provide 2 sample panels for each type of exposed cement plaster.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Sections 01600 and 01620.

B. All manufactured materials shall be delivered to the project site in their original unbroken containers bearing the manufacturer's label intact and legible.

C. Store cement and lime per manufacturer's instructions.

1.9 PROJECT CONDITIONS

A. Examine metal plaster bases, backing, attachments and accessories to receive plaster and determine if the applicable requirements of ASTM C1063 have been met.

B. Hot weather requirements:

1. Protect cement plaster from uneven and excessive evaporation during hot, dry weather, in strict accordance with ASTM C926.

C. Protection:

1. Protect all finished surfaces installed prior to plastering.

2. Maintain protection in place until completion of all plaster work.

PART 2 – PRODUCTS

2.1 CEMENT PLASTER (STUCCO) MATERIALS

A. Portland Cement: In accord with ASTM C150, Type 1, Gray.

B. Masonry Cement: In accord with ASTM C91.

C. Aggregate: In accord with ASTM C897; clean, sharp washed sand free from salt and foreign material, or Lake Wales (Florida) Mineral Free Sand with written approval of stucco manufacturer.

D. Water: Clean, fresh, potable and free from minerals and organic substances that would affect the set of the stucco.

E. Lime: In accord with ASTM C206-88.

F. Conventional mix or Broco Stucco Cement manufactured by Florida Mining and Materials Corp.

G. Bonding agent shall be Lambco Primer or Acrylbond by Lambert Corp., or Bonsal Acrylic Additive by W. R. Bonsal Co.

H. Sealants and Backing Material: See Section 07900 - Caulking and Sealants.

2.2 ACCESSORIES

A. Casing Beads:

1. No. 1038, 1050, 1058, or 1078 casing bead PVC by "Vinyltech", Plastic Components, Inc., or rigid vinyl No. 6638, 6650, 6658, or 6678 by Vinyl Corp.

B. Corner Beads:

1. Nos. 1A and 2 manufactured by Plastic Components, Inc.; all vinyl, or rigid vinyl Nos. 1 and 2 by Vinyl Corp.

C. Corner Reinforcement: 3 inch "Cornerite" manufactured by Unimast.

D. Channel Reveals:

1. Channel screeds Nos. CS38-75, CS50-75, CS58-75, or CS78-75 of rigid vinyl by Vinyl Corp.

E. Control Joints:

1. Joint Nos. 2038, 2050, 2058, or 2078 PVC by "Vinyltech", Plastic Components, Inc., or rigid vinyl Nos. 1538, 1550, 1558, or 1578 with connector clips by Vinyl Corp.

F. Expansion Joints:

1. Expansion joints PVC by Vinyl Corp., Nos. 4038, 4050, 4058, or 4078, as required by paragraphs: 3.3 D. and 3.4 F.

G. Strip Reinforcing: Expanded self-furring metal lath, 6 inch wide min., weighing not less than 3.4 pounds per square yard.

H. Tie Wire: 18 gauge minimum galvanized wire. Refer also to Section 09110, Metal Furring and Lathing.

I. Fry Reglet column collar of extruded aluminum alloy 6063-T5, 0.050 inch thick with

painted finish, color as selected by Architect, or an approved equal. Spacer component shall be extruded PVC of white color.

J. Special rigid vinyl shape for intersections of channel screeds (crosses, T's, L's, etc.), with grounds and reveals dimensions to match adjacent reveals, by Vinyl Corp.

K. Soffit vent by Vinyl Corp. w/ connectors.

1. V-400: 4 inch soffit vent.

2. V-200: 2 inch soffit vent.

3. 300VF: VF clip.

4. SV58-400F.

5. SV58-200F.

L. Architectural Accents, i.e., stucco bands, etc. shall meet requirements of Florida Building Code.

M. Other manufacturers" products of Amico Alabama Metals Industries Corp. will be acceptable as a substitute for the above-listed accessory.

2.3 MATERIAL PROPORTIONS

A. Three Coat Work - Metal Lath Base:

1. Scratch Coat: 1 part Portland cement; 2 parts masonry cement; 2-1/2 to 4 parts sand, or an approved equal Factory Blend Stucco mix.

2. Brown Coat: 1 part Portland cement; 2 parts masonry cement; 3 to 5 parts sand, or an approved equal Factory Blend Stucco mix.

3. Finish Coat: 1 part Portland cement; 2 parts masonry cement; 3 parts sand, or an approved equal Factory Blend Stucco mix.

B. Two Coat Work - Concrete and Masonry:

1. Bonding agent.

2. Brown Coat: 1 part Portland cement; 2 parts masonry cement; 3 to 5 parts sand, or an approved equal Factory Blend Stucco mix.

3. Finish Coat: 1 part Portland cement; 2 parts masonry cement; 3 parts sand, or an approved equal Factory Blend Stucco mix.

C. All stucco work shall have finish coat applied uniformly to produce a texture as approved by the Architect.

D. Three Coat Work - Suspended Ceiling or Soffit – (where shown or scheduled):

1. Scratch Coat: 1 bag Portland cement, 3/4 to 1 bag lime, 5 to 6 cu. ft. sand, or an approved equal Factory Blend Stucco mix.

2. Brown Coat: 1 bag Portland cement, 1 bag lime, 6 to 7 cu. ft. sand, or an approved equal Factory Blend Stucco mix.

3. Finish Coat: 1 bag Portland cement, 2 bags lime, 7 to 10 cu. ft. sand, or an approved equal Factory Blend Stucco mix.

2.4 MIXING

A. General:

1. Prepare all plaster in a mechanical mixer, using sufficient water to produce a workable consistency and uniform color.

2. After all ingredients are in the mixer, mix the plaster for 3 to 5 minutes or until the requirements of 10.2.1 are met.

3. The amount of water used in the plaster mix should be determined by the plasterer. Factors such as the suction of the base, or of the previous coat, water content of the aggregate, drying conditions, and finishing operations should be considered in determining water usage. Use of excessive water may result in dropouts, fall or slide off, excessive shrinkage, high porosity, and lower strength.

4. Plaster mixes for either base coat that has stiffened because of evaporation of water, may be re-tempered one time by remixing with additional water to restore the required consistency. Discard plaster not used within 2-1/2 hours from start of initial mixing. Severe hot, dry climatic conditions accelerate the stiffening of plaster. Such severe conditions may require this limit to be reduced.

5. Finish-Coat plaster shall not be tempered.

B. Mechanical Mixing:

1. Clean mixer of set or hardened materials before loading for new batch.

2. Maintain mixer in continuous operation while adding materials.

3. Conform to mixing sequence, cycle of operations, and time recommended by manufacturer of plaster materials.

C. Hand Mixing:

1. Do not hand mix unless authorized by Architect/Engineer.

2.5 PAINTING

A. See Section 09900 - PAINTING for stucco paint finishes.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

A. All items in this Section shall be installed by experienced skilled mechanics in the best workmanlike manner and in this trade's best standard practice, plumb, square, level, true and in strict accordance with manufacturer's printed instructions, ASTM C926 (Stucco) and ASTM C1063 for accessories and ASTM C841 Metal Lath and Furring.

B. Examine construction, grounds, and accessories to insure that finished plaster surfaces will be true to line, level, and plumb, without requiring additional thickness of plaster.

C. All metal, or PVC, or CPVC plastic members shall be free of rust, oil or other foreign matter, which could cause bond failure or unsightly discoloration.

D. Surfaces of solid bases to receive plaster, such as masonry, stone, cast-in-place or pre-cast concrete shall be straight and true within 1/4 inch in 10 feet and shall be free of form oil or other elements, which would interfere with proper bonding. Form ties or other metal obstructions and projecting joint mortar shall be removed or trimmed back even with the surface of the solid base by others.

E. Solid surfaces shall have the suction (ability to absorb water) or surface roughness, or both, to provide the bond required for the plaster.

F. Prepare smooth or nonabsorbent solid surfaces, such as cast-in-place or pre-cast concrete, to receive Portland cement plaster by one of the following methods:

1. Pressure washing, sandblasting, wire brushing, acid etching, or chipping, or a combination of these.

2. Application of a dash-bond coat applied forcefully against the surface, left untroweled, undisturbed, and moist cured for at least 24 hours.

3. Application of a bonding compound suitable for exterior or interior exposure solid surfaces in accordance with the manufacturer's written directions.

4. Where bond cannot be obtained over the entire surface to receive plaster by one or more of the methods or where total plaster thickness will exceed the maximum thickness specified for types of solid bases, install furred or self-furring metal plaster base in accordance with ASTM. C1063.

3.2 INSTALLATION OF ACCESSORIES

A. Attach plaster accessories per manufacturer's instructions. Use not less than 18 gauge wire tie for attachment to metal lath.

B. Use single length of beads wherever length of run does not exceed longest standard stock length available. Miter or cope at corners.

C. Set beads and plaster accessories level, plumb and true to line with A tolerance of not more than 1/8 inch in 10'-0" from plumb or level. Shim as required and align joints with concealed splices or tie plates.

D. Corner beads shall be installed on all external corners and edges of corner openings. Corner beads shall extend the full height of the corners on which they are applied and shall act as a ground.

E. Cornerite shall be applied to all internal corners of surfaces to be plastered.

F. Casing beads shall be applied where stucco stops and another material begins, or where stucco abuts metal door frames, exposed concrete block walls, at all exposed terminations, and/or where indicated. Secure casing beads to metal lath with No. 16 gauge wire at 6 inches o.c. minimum. Secure casing beads to masonry with galvanized concrete stub nails at 8 inches o.c.

G. Control Joints - Expansion Joints: At exterior walls, soffits and canopies of stucco on metal lath, space one-piece control joints not exceeding 12 feet in either direction. Where there is an intersection of vertical and horizontal joints, use factory made joints. Caulk splices and intersections exposed to the elements with a sealant approved by the accessories manufacturer. In soffits and canopies, break lath and channel behind control joints.

H. Install prefabricated sheet metal items required to be "plastered-in" flush, as shown and in accordance with manufacturer's instructions. Coordinate with installation of other work so that plaster will finish plumb and flush.

I. Where dissimilar plaster bases meet, reinforce juncture with continuous strip of self-furring metal lath securely attached to each base. Use strips not less than 6 inches wide.

J. PVC casing beads, channel reveals, expansion joints and control joints - caulk ALL intersections, butt joints and ends, conforming to ASTM D1784 Cell Classification 13244C.

K. Install Fry reglet collars at all columns where stucco ceilings abut to form a neat juncture.

L. Install ceiling and soffit vent molding around entire perimeter of all suspended stucco ceilings, or as shown on the drawings.

3.3 CEMENT PLASTER (STUCCO) - GENERAL APPLICATION

A. Apply bonding agent over concrete bases in strict accordance with printed recommendations of manufacturer's instructions.

B. Proper consistency for hand-applied plaster may be determined by slump testing. Material to be tested shall be taken from the mixer of the plastering hose. The

maximum allowable slump shall be 2-1/2 inches using a 2-inches by 4-inches by 6 inches high slump cone.

C. Curing shall mean that sufficient moisture shall be retained or intermittently applied as required to the plaster surface to permit the hydration process of the cementitious materials to continue. Climatic and job conditions will determine the most effective procedure for curing and time between coats. The contractor shall be responsible for curing.

D. Stucco which is excessively cracked or crazed will not be accepted. Remove and replace unacceptable stucco including base material if damaged.

E. Plaster thickness is measured from the back plane of metal reinforcement, exclusive of ribs or dimples and from the face of solid backing or support, with or without metal reinforcement to the finished plaster surface, inclusive of moderate texture variations.

F. Do not apply Portland cement-based plaster directly to the surface of solid backing consisting of gypsum board, gypsum plaster, wood, or rigid foam board-type products without the application of metal plaster base.

G. Apply each plaster coat to an entire wall or ceiling panel without interruption to avoid cold joints and abrupt changes in the uniform appearance of succeeding coats. Wet plaster shall abut set plaster at naturally occurring interruptions in the plane of the plaster, such as corner angles, rustications, openings, and control joints where this is possible. Cut joinings, where necessary, square and straight and at least 6 inches away from a joining in the preceding coat.

H. Use three-coat work over all metal plaster base, with or without solid backing. The combined total thickness shall be as shown. A dash-bond coat shall not replace one of the specified number of coats.

I. Two-coat work may be used only over solid bases. The combined total thickness shall be as shown or specified herein. A dash-bond coat shall not replace one of the specified number of coats.

J. Apply a back plaster coat, where required, only after the coat on the opposite side has set sufficiently to resist breaking or cracking the plaster keys.

K. Permit each coat to cure before the next coat is applied.

l. Dampen plaster coats that have become dry evenly with water prior to applying subsequent coats to obtain uniform suction. There shall be no visible water on the surface when plaster is applied.

3.4 APPLICATION TO METAL LATH

A. First coat shall be applied with sufficient material and pressure to form full keys through and to embed the metal reinforcement and with sufficient depth of material over the metal reinforcement to allow for scratching (scoring) of the surface.

1. As soon as the first coat has become firm, its entire surface shall be scratched (scored) in one direction only, to provide mechanical bond with the second coat. On vertical surfaces the scratching or scoring shall be horizontal.

2. The first coat shall become sufficiently rigid to support the application of the second coat without damage to the monolithic continuity of the first coat or it's key.

B. Second coat shall be applied with sufficient material and pressure to insure tight contact with the scratch coat and to bring the combined thickness of the first and second coats to the thickness specified.

1. The surface shall be brought to a true, even plane by rodding and surface defects and scratches shall be filled with plaster.

2. Float the surface uniformly to promote densification of the coat and to provide a surface receptive to bonding of the finish coat.

C. Finish coats shall be applied by machine or hand with sufficient material and pressure to completely cover and ensure tight contact with the base coat.

D. Thickness: per ASTM C926 - 3 coats.

1. Exterior:

a. Vertical Surfaces: 3/8 inch, 3/8 inch, 1/8 inch, total of 7/8 inch.

b. Horizontal Surfaces: 1/4 inch, 1/4 inch, 1/8 inch, total of 5/8 inch.

3.5 APPLICATION TO SOLID BASES

A. Before the application of stucco to concrete or masonry, all surfaces shall be clean, free from defect, and all accessories installed. The plane tolerance shall not exceed 1/4 inch in 10 feet.

B. Concrete surfaces to receive stucco shall be coated with a bonding agent to insure proper bond.

C. Dampen high-suction bases with clean water prior to the application of plaster. Do not dampen low-suction solid bases, such as dense concrete.

D. First coat shall be applied with sufficient pressure and material to ensure tight contact with and complete coverage of the solid base to the thickness specified.

1. Score this coat immediately.

2. Score vertical surfaces horizontally.

E. Finish coat shall be applied as specified above for the first coat, except that it shall be brought to the specified finish. Where any previous plaster has become dry,

the surface shall be evenly dampened with water to obtain uniform suction. Finish coats shall be applied by machine or hand with sufficient material and pressure to completely cover and ensure tight contact with the base coat.

F. Thickness: Per ASTM C926 - 2 coats.

1. Exterior:

a. Vertical surfaces:

(1). Unit masonry: 3/8 inch, 1/8 inch, total of 1/2 inch.

(2). Cast-in-place concrete: 1/4 inch, 1/8 inch, total of 3/8 inch.

b. Horizontal surfaces:

(1). Unit masonry: 1/4 inch, 1/8 inch, total of 3/8 inch.

(2). Concrete: 1/4 inch, 1/8 inch, total of 3/8 inch.

3.6 CURING AND TIME BETWEEN COATS

A. The timing between coats will vary with climatic conditions and types of plaster base. Temperature and relative humidity extend or reduce the time between consecutive operations. Cold or wet weather lengthens and hot or dry weather shortens the time period. Moderate changes in temperature and relative humidity can be overcome by providing additional heating materials during cold weather and by reducing the absorption of the base by pre-wetting during hot or dry weather.

B. To provide more intimate contact and bond between coats and to reduce rapid water loss, as soon as the first coat is sufficiently rigid to resist cracking, the second coat should be applied.

C. The amount of water and the timing for curing Portland cement plaster will vary with the climatic conditions, the type of base, and use or non-use of water-retentive admixtures.

D. Some moisture must be retained in or added back to freshly applied plaster. If the relative humidity is relatively high (above 75 percent relative humidity), the frequency for rewetting a surface may be reduced. It is hot, dry, and windy, the frequency of rewetting must be increased.

E. The method of curing selected should consider the physical characteristics of the structure as well as the previously mentioned conditions. The methods can be one or a combination of the following:

1. Moist curing is accomplished by applying a fine fog spray of water as frequently as required, generally twice daily in the morning and evening. Care must be exercised to avoid erosion damage to plaster surfaces. Except for severe drying conditions, the wetting of finish coat should be

avoided, that is, the basecoat prior to application of the finish coat.

2. Plastic film, when taped or weighted down around the perimeter of the plastered area, can provide a vapor barrier to retain the moisture between the membrane and plaster. Care must be exercised in placing the film: if too soon, the film may damage surface texture; if too late, the moisture may have already escaped.

3. Canvas, cloth, or sheet material barriers can be erected to deflect sunlight and wind, both of which will reduce the rate of evaporation. If the humidity is very low, this option may not provide adequate protection.

3.7 PATCHING

A. All defects and damaged areas shall be cut out and replaced to match adjacent surfaces at no extra cost to the Owner.

B. Repair cracks and indented surfaces by moistening plaster and filling with new material, troweled or tamped flush with adjoining surfaces.

C. Point-up finish plaster surfaces around items that are built into or penetrate plaster surfaces.

3.8 CLEANING AND PROTECTION

A. After completion of work, remove all scaffolding, tools and other equipment from the building, taking care not to damage work of other trades. Remove all plaster from glass, trim and other finishes. All plaster and stucco rubbish shall be removed and the building left broom clean.

B. Installer shall advise Contractor of requirements for protection of plaster from deterioration and damage until time of acceptance of the work.

3.9 MATERIAL AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and be replaced with new material in the best workmanlike manner at no extra cost to the Owner and to the full satisfaction of the Architect and Owner.

END OF SECTION 09180

SECTION 09260 – GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Interior gypsum wallboard.
2. Gypsum board panels for ceilings and soffits.
3. Tile backing panels.
4. Non-load-bearing steel framing.

B. Related Requirements:

1. Division 5 Section “Structural Metal Studs” for heavy gauge metal stud framing at load bearing and exterior walls.

2. Division 7 Section “Caulking and Sealants” and “Fire Resistive Joint Systems.”

1.3 REFERENCES

A. ASTM C36 – Standard Specification for Gypsum Wallboard.

B. ASTM C79 – Standard Specification for Gypsum Sheathing Board.

C. ASTM C442 – Standard Specification for Gypsum Backing Board and Coreboard.

D. ASTM C475 – Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

E. ASTM C630 – Standard Specification for Water-Resistant Gypsum Backing Board.

F. ASTM C645 – Standard Specification for Non-Load (Axial) bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board.

G. ASTM C754 – Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Board.

H. ASTM C840 – Standard Specification for Application and Finishing of Gypsum Board.

I. ASTM C1002 – Standard Specification for Steel Drill Screws for the Application of Gypsum board or Metal Plaster Bases.

J. ASTM E90 – Standard Test Method for Laboratory measurement of Airbourne-Sound Transmission Loss of Building Partitions.

K. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.

L. GA-201 – Using Gypsum Board for Walls and Ceilings.

M. GA-214 – Recommended Specification: levels of Gypsum Board Finish.

N. GA-216 – Recommended Specification for the Application and Finishing of Gypsum Board.

O. GA-600 – Fire Resistance Design Manual.

P. UL – Fire Resistance Design Manual.

Q. WH (Warnock Hershey) – Certification Listings.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design non-load-bearing steel framing, including comprehensive engineering analysis by a qualified professional engineer licensed in the State of Florida, using performance requirements and design criteria indicated.

1.5 SUBMITTALS

A. Product Data: For each product indicated.

B. Samples: For each textured finish indicated and on same backing indicated for Work.

C. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed structural design of framing, and sealed by the qualified professional engineer, licensed in the State of Florida, responsible for their preparation.

1. Submit shop drawings showing complete information for fabrication and installation of furred / suspended ceiling area framing. Indicate dimensions, location, size, spacing and gauge.
2. Provide installation layout.
3. Provide location and details of anchorage devices to be embedded in other construction.

D. Submit a manufacturer’s certificate that materials meet specification and project requirements.

1.6 QUALITY ASSURANCE

A. Qualification Data: For qualified professional engineer.

B. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

C. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

D. This subcontractor shall have been engaged with the installation of gypsum wallboard work and performed this work on at least three (3) projects equal in scope to this work. Submit data in writing showing compliance with these requirements to the Architect before starting of any work. See Section 00950 – Quality Assurance.

E. Gypsum Board Finish – Level 5 finish at all public areas per GA-214. The surface shall be uniform light skip trowel. Any horizontal or vertical GWB area scheduled to receive wall covering or a faux finish is to receive a level 4 finish, unless noted or scheduled otherwise.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Sections 01600 and 01620.

B. Deliver all materials in their original unopened containers with manufacturer’s label intact and legible.

C. Store materials per manufacturer’s instructions.

1.8 SAMPLE PANELS

A. Provide on-site erected samples each of the following:
1. Vertical taped joints.
2. Horizontal taped joints.
3. Inside corner.
4. Outside corner.

B. Obtain Owner’s and Architect’s acceptance of visual qualities of the sample panels before start of the gypsum wallboard work. Retain sample panels during construction as a standard for judging completed wallboard work. Do not alter, move, or destroy sample panels until wallboard work is complete.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.

2. Refer to Section 01600 materials and Equipment for product substitution requirements and approvals.

2.2 INTERIOR STEEL FRAMING

A. Steel Framing, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Metal complying with ASTM C 645 requirements.

a. Protective Coating:

1) Interior Applications: ASTM A 653/A 653M, G40, hot-dip galvanized zinc coating.
2) Exterior Applications: ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating

2. Light gauge steel framing: Unimast Corp., Dietrich Industries, Inc., Dale/Incor Industries of Florida, or approved equivalent.

3. Refer to specification Section 05410 for exterior and heavy gauge structural framing.

B. Suspended Ceiling and Soffit Framing:

1. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch- diameter wire.
2. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch diameter.
3. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch, a minimum 1/2-inch- wide flange, and 1-1/2” in depth.
4. Furring Channels (Furring Members):

a. Cold Rolled Channels: 0.0538-inch bare steel thickness, with minimum 1/2-inch- wide flange, 3/4 inch deep.
b. Steel Studs: ASTM C 645, in depth indicated.

1) Minimum Base Metal Thickness: 0.0179 inch.

c. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.

1) Minimum Base Metal Thickness: 0.0179 inch.

C. Partition and Soffit Framing:

1. Steel Studs and Runners: ASTM C 645, in depth indicated.

a. Minimum Base Metal Thickness: 0.0179 inch.0312 inch.

2. Deep-Leg Deflection Track: ASTM C 645 top runner with 2-inch- deep flanges.
3. Cold-Rolled Channel Bridging: 0.0538-inch bare steel thickness, with minimum 1/2-inch- wide flange, and in depth indicated.

a. Clip Angle: 1-1/2 by 1-1/2 inch, 0.068-inch- thick, galvanized steel.

4. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum bare metal thickness of 0.0179 inch, and 2 inches deep.
5. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

2.3 PANEL PRODUCTS

A. Recycled Content of Gypsum Panel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than (75%) seventy five percent.

B. Regional Materials: Gypsum panel products shall be manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

C. Panel Size, General: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

D. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Gypsum.
2. Georgia-Pacific Gypsum LLC.
3. Lafarge North America Inc.
4. National Gypsum Company.
5. USG Corporation.
6. Certainteed.

E. Gypsum Wallboard: ASTM C 1396/C 1396M.

1. Type X: 5/8 inch and with long edges tapered.

F. Sag-Resistant Gypsum Wallboard: ASTM C 1396/C 1396M, manufactured to have more sag resistance than regular-type gypsum board, 5/8 inch thick, and with long edges tapered. Apply on ceiling surfaces.

G. Water/Moisture Resistance Gypsum Board:

1. Core: Mold and moisture resistant gypsum core.
2. Surface Paper: Mold and moisture resistant paper on front, back, and along edges.
3. Long Edges – Tapered.
4. Overall Thickness – 5/8 inches.
5. Panel to comply with requirements of ASTM C1396.
6. Mold/Mildew Resistance: Score of 10 when tested in accordance with ASTM D3273.

H. Tile Backing Panels:

1. Cementitious Backer Units: Durock Board (Cement Board) complying with ANSI A118.9.
2. Size and Thickness: 5/8 inch.
3. Corrosion resistant fasteners.
4. Joint reinforcement: 2 inch wide Imperta Glass – fiber; open weave tape, Type P
5. Accessories: manufacturer's standard.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges.
3. Expansion (Control) Joint: Use where indicated or where unbroken panel lengths exceed 30 feet.

B. Aluminum Trim: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475.

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.
2. Exterior Gypsum Soffit Board: Paper.
3. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, flanges of trim accessories, and fasteners, use drying-type, all-purpose compound.

    a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.

D. Joint Compound for Tile Backing Panels:

1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.6 METAL FRAMING

A. Studs shall be screw type, roll-formed channel studs and tracks, of sizes shown on Drawings, fabricated from 25 gauge steel unless otherwise shown or specified, with stud flanges not less than 1-1/4 inch wide, of galvanized steel. Provide 20 gauge bottom track, typical.

B. At all hollow metal doorframes, cased openings, and end of walls, provide one 20 gauge metal stud. Headers up to 4’-0” wide shall be made of same. Headers from 4’-1” to 6’-0” shall be two 3-5/8 inch 20 gauge metal studs on edge. Headers 6’-1” to 8’-0” shall be two 6 inch 20 gauge metal studs on edge.

C. Studs shall meet or exceed ASTM C645 requirements with a minimum thickness of 0.0179 inch.

D. Use 20 gauge metal furring or metal studs at all locations scheduled to receive Durcok Board as shown/scheduled. Also, frame all outside corners using 20 gauge metal studs.

E. C. R. channel stiffeners formed of 16 gauge galvanized steel shall be installed in 25 gauge stud walls above the manufacturers specified limiting heights (10’-0” of higher).

F. RC-1 resilient channels of corrosion-resistant steel, fastened to framing per manufacturer’s recommendations.

2.7 DROPPED/FURRED DOWN CEILINGS

A. Shall be Steel Stud Furring and Steel Stud framing systems made up of 6 inches, 4 inches, 3-5/8 inches, 2-1/2 inches, and 1-5/8 inch vertical and horizontal framing or hangers. Design loads per Table for Typical Limiting Spans – Steel Stud Ceiling Systems, Deflections are not to exceed L/360.

2.8 DRYWALL SOFFITS

A. Braced soffit assembly consists of galvanized steel channel runners and studs faced with gypsum board, screw attached.

B. Maximum depth of 48 inches (vertically) and widths to 72 inches (horizontally) per requirements of Maximum Width and depth Dimensions Table of USG Systems Folder SA-923.

2.9 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining, latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Available Products:

    a. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.
    b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Isolation Strip at Exterior Walls:

1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

E. Fire Stopping / Penetration Seals

1. Refer to Section 07844 Fire resistive Joint Systems for rated assemblies and additional requirements.

PART 3 - EXECUTION

3.1 METAL FRAMING INSTALLATION

A. All items in this section shall be installed by experienced skilled mechanics in the best workmanlike manner and in this trade's best standard practice in strict accordance with manufacturer's printed specifications and installation recommendations.

B. Height of Partitions: Refer to Drawings for termination height of all partitions.

C. Install metal partitions system plumb, level and true. All joints, connections, etc. shall be fastened securely with proper fasteners as recommended by manufacturer's printed instructions. Fastening surface of any framing or furring shall not vary more than 1/8 inch from plane of faces of adjacent framing, bridging or furring members.

D. Metal partitions shall be erected by aligning floor and ceiling track to ensure plumb partition. Secure track with suitable fasteners at a maximum of 24-onch o.c. provide continuous tracks sized to match studs.

E. Provide fasteners at all corners and ends of runner tracks.

F. Provide additional studs to support inside corners at partition intersections and corners and to support outside corners, terminations of partitions, both sides of control joints (if any) and adjacent to all openings. For gypsum plaster base applications, Keep studs not less than 2 inch or more than 6 inch from inside corners.

G. Use full-length studs between runner tracks wherever possible. If necessary splice studs by nesting with a minimum lap of 8 inch and fasten laps with 2 screws through each flange.

H. Friction fit studs to runner tracks by positioning and rotating into place. Provide positive attachment to runner tracks for all studs using 7/16 inch self-tapping screws or stud clinching tool on both flanges of studs.

I. Provide rough framing at openings using full-length studs adjacent to jambs and horizontal header and sill tracks. Cut horizontal tracks to length, split flanges, bend webs at end of flange overlap, and screw attachment to jamb studs. Install cut to length, intermediate studs between jamb studs at head and sill sections at same spacing as full-length studs.

J. Stiffen drywall partitions horizontally with ¾ inch cold-rolled steel channel stiffeners. Install channels horizontally through stud knockouts at 4'-0" on center vertical spacing. Wire tie to each stud or secure as recommended by stud manufacturer. The 25 gauge metal stud walls, 16 inch o.c. up to and including the manufacturers specified limiting height, are not required to have C.R. channels unless required in specific areas due to extra loading requirements and/or fire rating requirements.

K. At plumbing chase walls provide two 1/2 inch by 12 inch high by thickness of wall wallboard stiffeners as per manufacturer's printed instructions, or 6" minimum width 25 gauge metal studs.

L. For extra heavy loads, shelf brackets, TV's, wall mounted furnishings, millwork, fixture brackets, handicap accessories, etc. provide proper supports as recommended by the manufacturer's printed instructions.

3.2 NON-LOAD-BEARING STEEL FRAMING INSTALLATION

A. General: Comply with ASTM C 754, and ASTM C 840 requirements that apply to framing installation.

B. Suspended Ceiling and Soffit Framing:

1. Suspend ceiling hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
3. Attach hangers to structural members. Do not support ceilings from or attach hangers to permanent metal forms, steel deck tabs, steel roof decks, ducts, pipes, or conduit.
4. Wire-tie furring channels to supports.

C. Partition and Soffit Framing:

1. Where studs are installed directly against exterior walls, install isolation strip between studs and wall.
2. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
3. Frame door openings to comply with GA-600 and with gypsum board manufacturer's applicable written recommendations, unless otherwise indicated. Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb, unless otherwise indicated.
    b. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

4. Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

D. Z-Furring Members: Erect insulation vertically and hold in place with Z-furring members.

1. Until gypsum board is installed, hold insulation in place with 10-inch staples fabricated from 0.0625-inch- diameter, tie wire and inserted through slot in web of member.

3.3 PANEL PRODUCT INSTALLATION

A. Gypsum Board: Comply with ASTM C 840 and GA-216.

1. Space screws a maximum of 12 inches o.c. for vertical applications.
2. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c.
3. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
4. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
5. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
6. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.
7. Laminating to Substrate: Comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.
8. Meet applicable requirements of governing authorities. Install to meet fire rating, STC requirements as indicated.
9. Comply with applicable recommendations, requirements of “Specifications of Application, Finishing of Gypsum Wallboard”; GA-216 and ASTM C840.
10. All gypsum wallboard to be sound, free of cracks, breaks, broken edges and corners. Precautions will be taken to prevent delamination and exposure to sunlight or ultra-violet radiation.
11. Cut wallboard by scoring, breaking or sawing. Work from face side. Scribe wallboard to fit abutting surfaces.
12. At radius walls, dampen both sides of wallboard; allow time for penetration of moisture to core before bending. Bend to give smooth, even curve on finish side.
13. Cut openings for electrical outlets, fixtures, piping and other penetrations. Maintain close tolerances for accurate fit to allow for covering of edges with plates and escutcheons. Patch all penetrations at fire or sound walls with penetration seal – see Section 07900 for additional requirements.
14. Apply wallboard to ceilings, horizontal surfaces, before applying to vertical surfaces.
15. Stagger joints between gypsum base sheets on opposite side of partitions. Do not location vertical joints within 8 inches from corners of door frames and other openings.
16. Use maximum practical length base sheets required to minimalize end joints and stagger end joints over studs.
17. Butt joints loosely, maximum gap 1/4 inch. Sand edges that have been cut.

18. Wallboard surfaces, corners of columns, walls and partitions shall be accurately aligned, level, plumb, true to line without any deflection, bow or twist, ready to receive without adjustments subsequent interior finishes.
19. Provide fasteners of the type and size recommended by the gypsum plaster base manufacturer for the applications shown and specified. Set heads slightly below surface of base, but do not break paper face.
20. Fasten to metal studs or metal furring with self-tapping screws. Comply with manufacturer's instructions for fastening, but do not exceed 12 inch o.c. spacing for screws; except in vertical applications, space screws from edge joints not more than 9 inches o.c.
21. Joints: Apply joint compound and tape according to Gypsum Wallboard System used in strict accordance with manufacturer's written instructions.
22. Thickness: Wallboard thickness shall be as required and shown on Drawings to fulfill compliance with the total wallboard system and its intended use.

B. Tile Backing Panels (Cement Board):

1. Cementitious Backer Units: ANSI A108.11, at wet wall locations indicated to receive tile or as scheduled.

C. Moisture Resistant Gypsum Board:
1. Install Moisture Resistant Board at all wet walls whether or not scheduled or shown (adjacent to or within 8 feet of plumbing fixtures) not scheduled to receive tile. Tiles walls to receive cement board backer.

3.4 FINISHING

A. Installing Trim Accessories: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

1. Aluminum Trim: Install in locations indicated on Drawings and where recommended in writing by ceiling suspension system manufacturer for trim for suspended ceilings.

B. Finishing Gypsum Board Panels: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Finish level as specified or scheduled.

1. Prefill open joints, rounded or beveled edges, and damaged surface areas.
2. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

C. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:

1. Level 1: Embed tape at joints in ceiling plenum areas and concealed areas.
2. Level 2: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges where panels are substrate for tile.

3. Level 3: Where panels are substrate for vinyl wallcovering (VWC) as recommended by VWC manufacturer.
4. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges at panel surfaces that will be exposed to view, unless otherwise indicated.
5. Level 5: A level 4 finish with an additional level of surface treatment, such as a thin skim coat of joint compound applied to the entire surface.

D. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.5 PERIMETER CAULKING INSTALLTION

A. Caulk perimeter of indicated applications as follows:
1. At all sound insulated partitions provide continuous beads of sealant at juncture of both faces of runners or plates with floors, walls and ceiling construction and wherever gypsum wallboard abuts dissimilar materials.
2. At control joints provide continuous bead of sealant at faces of control joints. Caulk prior to installation of surface-applied control joint accessories and locate at proper depth in joint to allow for insertion of expansion portion of control joint accessory.
3. At openings and cutouts, fill open spaces between gypsum base and fixtures, cabinets, ducts and other flush or penetrating items, with continuous bead of sealant.
4. Caulk sides and backs of electrical boxes to completely seal openings and joints at sound insulated walls and fire rated walls.

3.6 SUSPENDED CEILINGS

A. The Contractor shall furnish and install the suspended ceiling system in strict accordance with ASTM C636 and the manufacturer’s printed instructions.

B. The ceiling suspension system shall be leveled to within 1/8 inch in 12 feet prior to placing drywall and the deflection of any component shall not exceed 1/360 of span.

C. The ceiling system shall be supported from the structure above the metal stud framing or No. 9 gauge hanger wire minimum. The supporting of wires from mechanical or electrical equipment, piping, ductwork or other equipment above ceiling SHALL NOT BE PERMITTED.

D. Additional supports shall be provided for light fixtures, A/C grilles, panel access doors, etc.

3.7 CUTTING AND PATCHING

A. Cut, patch, repair and point-up plaster as required and as directed by the Architect. Repair cracks and indented surfaces by moistening plaster and filling with new material, troweled or tamped flush with adjoining surfaces.

3.8 CLEANING AND PROTECTION

A. All finish materials and finish surfaces must be protected from contact with veneer – other surfaces that have been stained, marred or otherwise damaged during the plastering work.

B. When work is completed, remove unused materials, containers and equipment and clean floors of all debris and leave room broom clean. Installer shall advise Contractor of requirements for protecting the work from deterioration and damage until time of acceptance.

3.9 MATERIAL AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and be replaced with new material in the best workmanlike manner at NO EXTRA COST to the Owner.

END OF SECTION 09260

SECTION 09310 – CERAMIC TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENT

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Porcelain floor and wall tile.
2. Glazed ceramic mosaic wall tile.

B. Related Sections include the following:

1. Division 7 Section “Membrane Waterproofing” for membrane waterproofing (showers).
2. Division 15 for floor drains.
3. Division 9 Section “Gypsum Board Assemblies” for cement backerboards within drywall assemblies for all wall tile applications and ceramic wall boards porcelain panels.

1.3 SUBMITTALS

A. Product Data: For each product indicated.

B. Compatibility Certification: Provide certification of compatibility of sealer, grout and tile surfaces.

C. Maintenance and cleaning information for care tile floor and sealer.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Such products include, but are not limited to; porcelain tile, setting material, grout, sealant, noise transference products, transition strips, and expansion joint hardware.

B. Shop drawings indicating tile patterns and locations of widths of expansion, contraction, control and isolation joints in tile substrates and finished tile surfaces.

C. Submit list of all subcontractors that will be used on the specified project. Proof of Workman's Compensation insurance must be provided for each subcontracted worker

D. Samples: 2 Sets- 1 for Architect/Owner, 1 kept on site in a safe location through project completion.

1. Each type, composition, color, and finish of tile, Schluter Schiene transition strips and Rondec tile cap and grout.

2. Manufacturer's certifications and installation procedures.

1.5 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 5 (Five) percent of amount installed, but not less than one box for each type, composition, color, pattern, and size indicated. Label boxes to indicate room location and application and mfg's contact information.

1.6 REFERENCE STANDARDS

A. American National Standards Institute (ANSI) A137.1 American National Standard Specifications for Ceramic Tile.

B. American National Standards Institute (ANSI) A108.1A - A108.13 American National Standard Specifications for the Installation of Ceramic Tile.

C. American National Standards Institute (ANSI) A118.1 - A118.12 American National Standard Specifications for the Installation of Ceramic Tile.

D. American National Standards Institute (ANSI) A136.1 American National Standard Specifications for the Installation of Ceramic Tile.

1.7 QUALITY ASSURANCE

A. Tile Manufacturer: Company or Affiliate Company specializing in ceramic tile, trim units and/or thresholds. Obtain tile from a single source with resources to provide products of consistent quality in appearance and physical properties.

B. Installation System Manufacturer: Company specializing in adhesives, mortars, grouts and/or other installation materials including ISO 9001 certification unless noted otherwise by Architect.

C. Installer qualifications: company specializing in installation of ceramic tile, mosaics, with documented experience with similar installations of similar scope, materials and design; or written certification and approval of the installers qualifications from the material supplier.

1.8 MOCK-UPS

A. Provide mock-up of each type/style/finish/size/color of ceramic tile, trim unit and threshold, along with respective installation adhesives, mortars, grouts and other installation materials. Mock ups for floor tile shall be a minimum of 3 tiles wide x 3 tiles high and include both polished and unpolished versions of the tile as scheduled.

B. For patterned wall tile, layout a measured profile of the tile pattern and obtain Architect's and Owner's approval prior to placing the tile. The pattern shall be continuous at adjoining and intersecting walls.

1.9 PRE-INSTALLATION CONFERENCE

A. Pre-installation conference: At least three weeks prior to commencing the work attend a meeting at the jobsite to discuss conformance with requirements of the Drawings, Specification and job site conditions. Representatives of Owner or Owner's designated representative, Architect, General Contractor, , tile subcontractor, and any other parties who are involved in the scope of this installation must attend the meeting.

B. Layout and field verify wall tile pattern prior to placing tile and as part of pre-installation meeting.

1.10 SEQUENCING AND SCHEDULING

A. Coordinate installation of tile work with related work.

B. Proceed with tile work only after curbs, vents, drains, piping, and other projections through substrate have been installed and when substrate construction and framing of openings have been completed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles, where titles below introduce lists, the following requirements apply for product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified as the Basis of Design.

2. Product Source Reference: Mike Hubert – Garden State Tile @ 1-407-982-0430. Carolina Coelho – Tilebar @ 1-888-541-3840

2.2 TILE PRODUCTS

A. Manufacturers: The Basis-of-Design shall be:

1. As scheduled and shown on the drawings, or as selected by the Architect and the Owner. The pattern, size and material designations are shown on the drawings.
2. Tile components shall include, but are not limited to, field tile, tile borders, wall tile, wainscot tile, tile base, accent tile and other elements shown on the drawings.

B. Subject to compliance with requirements for matching the color match, texture, and tile specifications, manufacturers offering products that match the color samples and tile size scheduled, or that are approved as substitutions by the Architect and the Owner or Owner's designated representative may include the following manufacturers:

1. Garden State Tile
2. Tilebar
3. Emser Tile

C. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

D. Porcelain Floor Tile:

1. Composition: Porcelain.
2. Surface: >250, per ASTM C501, Matte and polished finishes.
3. Module Size: Reference Drawings for module size No substitutions or changes to tile sizes will be authorized.
4. Nominal Thickness: 3/8 inch nominal (MIN). unless otherwise defined Face: Factory Rectified For Flatness, Squareness and Consistent Thickness.
5. Color and Pattern: As selected by the Architect and the from manufacturer's full range and to match the tile colors and finished shown in the drawings.
6. Trim Units: Coordinated with sizes and coursing of adjoining flat

tile where applicable and matching characteristics of adjoining flat tile.

a. Provide shapes and borders as shown on the Drawings and as, selected from manufacturer's standard shapes. All corners should be mitered.

7. Tile Floor Base

a. At public restrooms, provide square edge module size same as adjoining floor tile with Schluter Rondec cap #80 trim continuous at all base tile; 1-Tile high tile base – (6 inches high), unless noted otherwise, color to match the adjoining floor tile scheduled & vertical edges or adjoining corners. Provide metal cove at the base of all tiled walls, with matching preformed corners and trim.

b. Mech. areas and Back of House (non-public areas)
Areas provide cove tile base only 4" inches high where scheduled.

c. At non-public areas the base and wainscot tile where scheduled color to match wall tile color.

d. Provide metal square edge cap at public areas, lobby & corridors at the top of tile base; metal cove trim is not required at tile base and floor tile intersection at the lobby & corridor.

2.2 ACCESSORY MATERIALS

A. Metal Trim: Schluter "Rondec" bullnose type profile with symmetrically rounded visible surface with ¼" (6mm) radius, integrated trapezoid perforated anchoring leg, and integrated grout joint spacer. Finish to be Satin Nickel Anodized aluminum. Thickness to match tile thickness. Metal trim system shall include preformed inside and outside corners and concealed connectors at splice joints where trim cannot be run continuously. Schluter (Schiene" square corner type profile for tile base cap. Schluter "cove" for restroom & locker rooms tile wall & base intersection with wall tile. Provide preformed corners & joints for all metal trim.

B. Recessed Soap Dishes: "Recess-it" Tile Backer: Aluminum – prefabricated waterproofing soap dish & floating shelf.

1. One Recess-It with optional floating shelf (Rec 1418) and one Recess-It (Rec 614) at each shower.

2.3 SETTING AND GROUTING MATERIALS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Bostick

2. C-Cure
3. Custom Building Products
4. DAP, Inc.
5. Laticrete International, Inc.
6. MAPEI Corporation
7. Southern Grouts & Mortars, Inc.
8. Summitville Tiles, Inc.
9. TEC Specialty Products, Inc.

B. Latex-Portland Cement Mortar (Thin Set Tile/Thick Set Bed): ANSI A118.4.

1. Prepackaged dry-mortar mix containing dry additive to which only water must be added.
2. Prepackaged dry-mortar mix combined with liquid-latex additive.
3. For wall applications, provide nonsagging mortar.
4. Approved by the selected manufacturer for specific applications.
   a. Available Products.
   b. Modified non-sagging dry-set cement mortar for large and heavy tile thin-set applications complying with ANSI A118.4, A118.11 and ISO 13007 C2TES1P1: MAPEI “Ultraflex LFT” or Architect approval equal.
5. Manufacturers standard cementitious setting bed at tile floors with a thick set setting bed.

C. Standard Unsanded Cement Grout: ANSI A118.6, color selected by Architect.

1. Unsanded Grout: Unsanded polymer-modified Portland cement ceramic tile grout, complying with ANSI A118.6 and ISO 13007 CG2WA, for joints less than 1/8 inch (3 mm) wide; MAPEI “Keracolor U” or Architect approved equal.

D. Polymer-Modified Tile Grout: ANSI A118.7, color as selected from manufacturers full range.

1. Polymer Type: Liquid-latex form for addition to prepackaged dray-grout mix.

2. Sanded Grout: Fast-setting sanded polymer-modified grout, complying with ANSI A118.7 and ISP 13007 CG2WAF, for joints between 1/16 inch and 1 inch (1.5 mm and 25 mm) wide; MAPEI “Ultracolor Plus” or Architect approved equal.

E. Epoxy Tile Adhesives: (Restroom floors & walls)

1. ANSI 118.3: Where indicated on the Drawings or where scheduled or specified for setting tile as specified by ANSI A108.6 Chemical Resistant, Water Cleanable tile setting and grouting epoxy over proper substrates. Kerpoxy by Mapai or Architect approved equal.

2.4 MISCELLANEOUS MATERIALS

A. Elastomeric Sealants: Elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 7 Section "Joint Sealants."

1. One-Part, Mildew-Resistant Silicone: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for in-service exposures of high humidity and extreme temperatures.

a. Available Products:

1. Dow Corning Corporation; Dow Corning 795.
2. GE Silicones; Sanitary 1700.
3. Pecora Corporation: Pecora 898 Sanitary Silicone Sealant.

a. Grout Sealer: DuPont – "Stone Tech" professional grout sealer for ceramic and porcelain tile and grout, water based, low solids coating, clear sealer **No sealer shall be applied to the face of the tile, base or wainscot; sealer shall be applied to grout only at Public areas and factory applied sealer/finish is scheduled or specified.**

PART 3 - EXECUTION

3.1 SUBSTRATE EXAMINATION

A. Verify that surfaces to be covered with ceramic tile, mosaics, pavers, brick, stone, trim or waterproofing are:
1. Sound, rigid and conform to good design/engineering practices;
2. With maximum deflection under all live, dead and impact loads, including concentrated loads, of L/360 for ceramic tile, mosaics, pavers or brick;
3. Clean and free of dust, dirt, oil, grease, sealers, curing compounds, laitance, efflorescence, form oil or loose plaster, paint and scale;
4. Level and true to within ¼" in 10', and not more than 1/16" in 1" Variation from substrate high points, for applications by the thin bed method over substrate, thin waterproof membrane or think crack isolation membrane;
5. Not leveled with gypsum or asphalt based compounds;
6. Dry as per American Society for Testing and Materials (ASTM) D4263 **"Standard Test for Determining Moisture in Concrete by the Plastic Sheet Method."**

B. Concrete surfaces shall also be:
1. Cured a minimum of 28 days at 70°F, including an initial (7) day period of wet curing;
2. Wood float finished, or better, if the installation is to be done by the thin bed method;
3. Advise General Contractor and Architect of any surface or

substrate conditions requiring correction before tile work commences

3.2 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

B. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions.

C. Remove protrusions, bumps, and ridges by sanding or grinding.

D. Blending: For tile exhibiting color variations, use factory blended tile or blend tiles at Project site before installing.

E. Feathering: Where tile meets carpet, feather the tile up to and flush with the carpet, no transition strips will be accepted between carpet and new tile. For thresholds, all threshold locations must be approved prior to installation. Anchor guards to substrate.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation" latest edition. Comply with TCA installation methods indicated in ceramic tile installation schedules.

C. Cut and fit ceramic tile, brick or stone neatly around corners, fittings, and obstructions. Perimeter pieces to be minimum half tile, brick or stone. Chipped, cracked, split pieces and edges are not acceptable. Make joints even, straight, plumb and of uniform width to tolerance +- 1/16” over 8’. Install divider strips at junction of flooring and dissimilar materials.

D. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

E. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Grind cut edges of tile abutting trim, finish, or built-in items. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

F. Jointing Pattern: Lay tile in grid patterns exactly as shown on the Interior Design Drawings Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated. Grout joints shall not exceed 1/8" in width.

G. Grout tile to comply with requirements of ANSI A108.10, unless otherwise indicated.

H. Install tile on floors with the following joint widths:
1. Porcelain Tile 1/8 inch.
2. Install floor leveling material as required to achieve floor flatness value to meet mfgs. and TCA handbook, latest edition requirements for grout joint width specified.
3. Confirm tile cutting and joint pattern with Architect at sloped floors and drains.

I. Stone Thresholds: Install stone thresholds at tile floor transitions at doorways or locations specified, indicated or scheduled; set in same type of setting bed as abutting field tile, unless otherwise indicated.

1. Set thresholds in latex-portland cement mortar for locations mortar bed would otherwise be exposed above adjacent non-tile floor finish.

J. Install tile on walls with the following joint widths: grout joints shall not exceed 1/8".

1. Porcelain Tile Trim Units: Match mfgs. joint width of field tile.

K. Metal Trim: Install metal trim profile as specified, scheduled or shown on the Drawings in accordance with the manufacture's installation requirements. Furnish and install preformed metal joints at inside and outside corners. Butt joints shall be installed with concealed internal splices. Joints shall be kept to a minimum and the trim profiles shall be installed with the longest run of material available without butt joints.

L. Setting Bed: Install cementitious setting bed at all sloped floors where scheduled or indicated. Coordinate recessed floor requirements prior to cement slab floor placement.

3.4 CLEANING

A. Clean excess mortar/epoxy from veneer surfaces with water before they harden and as work progresses. Do not contaminate open grout/caulk joints while cleaning. Sponge and wash veneers diagonally across joints. Do not

use acids for cleaning. Polish with clean dry cloth. Remove surplus materials and leave premises broom clean.

3.5 PROTECTION

A. Protect finished installation under provisions of Division 1 Section “Temporary Facilities and Controls.” Close areas to other trades and traffic until tile being installed has set firmly. Keep traffic off horizontal Portland cement thick bed mortar installations for at least 72 hours at 70°F.

B. Keep floors installed with epoxy adhesive closed to traffic for 24 hrs. at 70°F, and to heavy traffic for 48 hours @ 70°F unless instructed differently by manufacturer. Use kneeling boards, or equivalent, to walk/work on newly tiled floors. Cure tile work in restrooms for 7 days for epoxy based grout and 14 days for latex-Portland cement based grout @ 70°F before walking on the surface. Extend period of protection of tile work at lower temperatures, below 60°F and at high relative humidity (>70% R.H.) due to retarded set times of mortar/adhesives. Replace or restore work of other trades damaged or soiled by work under this section.

3.6 FLOOR TILE INSTALLATION SCHEDULE

A. Interior floor installation on concrete; thin-set mortar; TCA F113:

1. Prep walls as required for application of new tile work.
2. Thin-Set Mortar: Latex portland cement mortar.
3. Thick-Set Mortar: Where shown, or noted, or scheduled or required for floor leveling areas.
4. Grout: Polymer-modified unsanded grout, epoxy grout at the restrooms.
5. Refer to schedule and drawings for extent and location of tile.

3.7 WALL TILE INSTALLATION SCHEDULE

A. Interior wall installation; thin-set mortar; over cement board; TCA W243:

1. Thin-Set Mortar: Latex portland cement mortar.
2. Grout: Polymer-modified unsanded grout.
3. Refer to schedule and drawings for extent and location of tile.

B. GC to supply and install cement backer board for all “wet” wall tile and mosaic tile areas. Reference Specification Section 09260, Gypsum Board Assemblies for cement backer board requirements and products.

C. **PRE-FLOAT METHOD (*FOR FLOOR LEVELING AS REQUIRED)***

B. Over clean, dimensionally stable and sound concrete or masonry substrates, apply latex-Portland cement mortar as scratch/leveling coat in compliance with

current revision of ANSI A108.1 (A-1 through A-3; A-4.1a.1.4). Float surface of scratch/leveling coat plumb, true and allow mortar to set until firm. For installation of ceramic tile, mosaic, follow *Wall Tile Installation Schedule* (3.7).

3.8 MATERIAL AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and be replaced with new material in the best workmanlike manner at NO EXTRA COST to the Owner.

END OF SECTION 09310

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SECTION 09325 - NATURAL STONE GRANITE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and Division 1 Specifications, apply to this Section.

1.2 SUMMARY

A. Furnish all labor, materials, tools, equipment, etc. and services necessary and incidental to the complete fabrication, furnishing and erection of this Section as shown, noted, detailed and reasonably implied on the drawings and in the specifications.

B. Stonework includes but is not limited to the following:
   1. Reception desk countertop and lobby countertop and splashes in the reception area.
   2. Flight Crew Break Area countertop and splashes.

1.3 RELATED SECTIONS:

A. Division 6 Section “Interior Architectural Woodwork”.

B. Division 7 Section “Caulking and Sealants”.

1.4 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01330

B. Product Data: Submit manufacturer's technical data for each type of stone, stonework accessory and other manufactured product required.

C. Samples: Submit 3 samples for each color, grade, finish, type and variety of stone consisting of units not less than 12 inches by 6 inches. Include 2 or more units in each set of samples showing the full range of appearance characteristics to be expected in completed work.

D. Submit shop drawings showing locations, elevations and details, drawn to scale.

1.5 QUALITY ASSURANCE

A. Single Source Responsibility for Stone: Obtain each color, grade, finish, type and variety of stone from a single source with resources to provide materials of consistent quality in appearance and physical properties, including the capacity to cut and finish material without delaying the progress of the work.

B. Single Source Responsibility for Setting Materials: Obtain mortar ingredients of uniform quality and from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.

C. Installer Qualifications: Engage an Installer who has successfully completed interior stonework similar in material, design and extent to that indicated for this project. List in writing (5) five projects and furnish with submittals.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Section 01600.

B. Deliver materials to project in undamaged condition.

C. Store and handle stone and related materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breakage, chipping, or other causes.

D. Store cementitious materials off the ground, under cover, and in a dry location.

1.7 WARRANTY

A. Section 01740 Warranties and Bonds.

PART 2 – PRODUCTS

2.0 MATERIALS

A. Stone material: Refer to Room Finish Schedule and Drawings for locations.

B. Comply with referenced standards and other requirements indicated applicable to each type of material required.

2.1 INTERIOR MARBLE / GRANITE

A. Granite building stone standards:
1. Granite: ASTM C615, classification as selected.

B. Finish of all granite slabs and components as follows:

1. Polished - as indicated on drawings, schedules and approved samples by the Owner and Architect. Exposed countertop visible-edges to receive full bullnose; eased edge at splashes where not abutting drywall.

C. Color:

1. Basis Design: Black Granite – “Blue in the Night” by Mystic Granite or Architect and Owner approved equal.

D. Manufacturer/Supplier of granite slab: Subject to compliance with requirements, provide marble tile of following distributors (or approved equal):
   1. Mystic Granite
   2. International Granite & Marble
   3. Tile & Marble Collection Inc.
   4. Associated Imports
   5. Demarco Tile Inc.

2.2 THIN-SET PRODUCTS

A. Latex-Portland Cement Mortar: ANSI A118.4, of the following composition:
   1. Latex additive (water emulsion) of type described below, serving as a replacement for part or all of gauging water, added at job site to prepackaged dry mortar mix supplied or specified by latex manufacturer.
      a. Latex type: Manufacturer's standard

B. Manufacturers: Subject to compliance with requirements, provide products of one of the following manufacturers:
   1. American Olean Tile Co., Inc.
   2. Laticrete International Inc.
   3. W. R. Bonsal Co.

2.3 GROUTS

A. Grout colors: Provide colors to comply with the following requirements:
   1. Provide color as selected by Architect from manufacturer’s standard colors.

B. Latex-Portland Cement Grout: ANSI A118.6, of the following composition:
   1. Latex additive (water emulsion) serving as a replacement for part or all of gauging water, added at job site to prepackaged dry grout mix, with type of latex and dry grout mix complying with requirements indicated below:
      a. Latex type: Manufacturer's standard.
      b. Grout type: Commercial Portland cement grout specified or supplied by latex manufacturer.

C. Manufacturers: Subject to compliance with requirements, provide products of one of the following manufacturers:
   1. Manufacturers of Commercial Portland Cement Grouts:
      a. American Olean Tile Co., Inc.
      b. Laticrete International Inc.
      c. W. R. Bonsal Co.

   2. Manufacturers of Latex-Portland Cement Grouts:
      a. American Olean Tile Co., Inc.
      b. Laticrete International Inc.
      c. W. R. Bonsal Co.

2.4 STONE ACCESSORIES

A. Cleaner: Provide stone cleaners of proper formulation for kinds of stones, finishes and applications indicated, as recommended by stone producer and, if sealer specified, by sealer manufacturer. Do not use acid-type-cleaning agents or other cleaning compounds containing caustic or harsh fillers, except where expressly approved by stone producer for type of condition involved.

B. Sealer for granite: Colorless, stain resistant sealer which will not affect color or physical properties of stone surface, such as Ceramaseal, or as recommended by sealer and by stone producer for application indicated.

2.5 MORTAR AND GROUT MIXES

A. General: Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water repellent agents, anti-freeze compounds, or calcium chloride, unless otherwise indicated.

B. Mixing: Combine and thoroughly mix cementitious materials, water and aggregates in a mechanical batch mixer; comply with referenced ASTM or ANSI standard, as applicable, for mixing time and water content, unless otherwise indicated.

C. Setting Mortar for Wall Facing and Trim: Type N complying with ASTM C270, Proportion Specification.

2.6 FABRICATION

A. General: Fabricate interior stonework in sizes and shapes required to comply with requirement indicated, including details on drawings and final shop drawings.

B. For granite comply with recommendations of Marble Institute of America Inc. (MIA) as published in "Dimensional Stone - Design Manual III".

C. Cut stones to produce pieces of thickness, size and shape indicated or required and within fabrication tolerances recommended by applicable stone association or stone source, for faces, edges, beds, and backs.
   1. Thickness of granite counter tops: 3 cm and as indicated on drawings. All backsplashes: 4” high x 2 cm thick.

D. Dress joints (bed and vertical) straight and at 90 degree angle to face, unless otherwise indicated.
   1. Countertops to have tight joints, maximum 1/16 inch width filled with clear silicone.

E. Finish exposed faces and edges of stones to comply with requirements indicated for finish under each type and application of stone required and to match approved samples and field-constructed mock-ups.

PART 3 – EXECUTION

3.1 INSTALLATION GENERAL

A. All items in this Section shall be installed by experienced skilled mechanics in the best workmanlike manner and in this trade's best standard practice.

3.2 EXAMINATION

A. Require Installer to examine surfaces to receive stonework and conditions under which stonework will be installed and to report in writing any conditions, which are not in compliance with requirements. Do not proceed with installation until surfaces and conditions comply with requirements indicated or for execution of other work which affects stonework.

3.3 PREPARATION

A. Advise Installers of other work above specific requirements relating to placement of inserts, reglets and similar items that will be used by stonework installer for anchoring, supporting and flashing of stonework. Furnish Installers of other work with drawings or templates showing location of these items.

3.4 SETTING STONE, GENERAL

A. Execute stonework by skilled mechanics, and employ skilled stone fitters at the site to do necessary field cutting, as stones are set.
   1. Use power saws to cut stones; for exposed edges, produce edges that are cut straight and true.

B. Set stones to comply with requirements indicated on drawings and final shop drawings. Install anchors, supports, fasteners and other attachments indicated or necessary to secure stonework in place. Shim and adjust anchors, supports and accessories to set stones accurately in locations indicated with uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances.

3.5 INSTALLATION OF INTERIOR WALL SPLASH AND TRIM

A. Erect interior wall facing and trim plumb and true with joints uniform in width and accurately aligned. Provide setting buttons as required to maintain joint width.

B. Position backsplashes to maintain a 1/4 inch or less setting bed.

3.6 ADJUSTING, CLEANING AND SEALING

A. Remove and replace stonework of the following description:
   1. Broken, chipped, stained or otherwise damaged stones

2. Defective joints
3. Stonework not complying with other requirements indicated.

B. Replace in manner, which results in stonework matching approved samples, complying with other requirements, and showing no evidence of replacement.

C. Clean interior stonework after setting, pointing, grouting and curing is complete; use procedures recommended by stone producer for types of application indicated.

D. Apply sealer to cleaned interior stone countertops in compliance with sealer manufacturer's instructions.

E. Protect interior stone during construction period with Kraft paper or other heavy covering of type that will not stain or discolor stone.

F. Before inspection for substantial completion, remove protective covering and clean sealed surfaces using procedures and materials recommended by sealer manufacturer.

3.7 MATERIALS AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and be replaced with new material in the best workmanlike manner at NO EXTRA COST to the Owner.

END OF SECTION 09325

SECTION 09400- TERRAZZO FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Thin-set, epoxy-resin terrazzo flooring, custom patterned graphic and metal inserts.

B. Related Sections:

1. Division 3 Section "Cast-In-Place Concrete" for requirements for concrete slabs and to confirm coordination of terrazzo flooring edge trim installations that are to be concurrent with concrete slab construction.
2. Division 7 Section “Vapor Retarder” for vapor barriers and accessories installed under concrete slabs.

1.3 DEFINITIONS

A. Aggregate: Multiple colored Marble chips, Mother of Pearl and Glass or other types of aggregate. Multiple colors to achieve graphic effect per the Drawings

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to terrazzo including, but not limited to, the following:

a. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
b. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
c. Review special terrazzo designs and patterns and schedule of installation.

B. Conduct a pre-construction meeting and prepare a mock up with the Architect to ensure proper distribution and application of aggregate broad cast.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include terrazzo installation requirements. Include plans, elevations, sections, component details, and attachments to other work. Show layout of the following:

1. Divider strips.
2. Control-joint strips.
3. Abrasive strips.
4. Precast terrazzo jointing and edge configurations.
5. Terrazzo patterns.

C. Samples: For each exposed product and for each color and texture specified:

1. Samples for Initial Selection: NTMA color plates showing the full range of colors and patterns available for each terrazzo type; a minimum of 6 inches square in size.
2. Samples for Verification: For each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected. Label each terrazzo sample to identify manufacturer's matrix color and aggregate types, sizes, and proportions. Prepare (3) Three Samples of same thickness and from same material to be used for the Work, in size indicated below:

a. Terrazzo: 2’-0”X2’-0”- square Samples.
b. Accessories: 6-inch- long Samples of each exposed strip item required.

D. Schedule of installation with key milestone dates.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Material Certificates: For each type of terrazzo material or product, from manufacturer.

C. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.

D. LEED Submittals:

1. Product Data for Credit MR 4.1: for aggregates, indicating percentages by weight of pre-consumer recycled content.
   a. Include statement that indicates cost for each product having recycled content.
2. Product Data for Credit MR 5.1: For products manufactured within a 500 mile (804.7 km) radius of the project.
3. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content and chemical components.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For terrazzo to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications:

1. Engage an installer who is a contractor member of NTMA.
2. Engage an installer who is certified in writing by terrazzo manufacturer as qualified to install manufacturer's products.

B. Source Limitations: Obtain primary terrazzo materials from single source from single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.

C. Source Limitations for Aggregates: Obtain each color, grade, type, and variety of granular materials from single source with resources to provide materials of consistent quality in appearance and physical properties.

D. Pre-installation Conference: Conduct conference at project site to comply with requirements in Section 01310 Project management and Coordination. Prior to concrete substrate placement, review methods and procedures related to terrazzo including, but not limited to, the following:

1. Inspect and discuss installation procedures, joint details, job site conditions, substrate specifications, vapor barrier details and coordination with other trades.
2. Review and finalize construction schedule and verify availability of materials, installer’s personnel, equipment and facilities needed to make progress and avoid delays.
3. Review special terrazzo designs and patterns.
4. Review plans for concrete curing and site drying to enable timely achievement of suitable slab moisture conditions.

E. NTMA Standards: Comply with NTMA’s “Terrazzo Specifications and Design Guide” and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in supplier's original wrappings and containers, labeled with source's or manufacturer's name, material or product brand name, and lot number if any.

B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature, concrete curing period, moisture, ventilation, and other conditions affecting terrazzo installation.

B. Field Measurements: Verify actual dimensions of construction contiguous with precast terrazzo by field measurements before fabrication.

C. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation.

D. Close spaces to traffic during terrazzo application and for not less than 24 hours after application unless manufacturer recommends a longer period.

E. Control and collect water and dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.

F. Provide temporary power and water as required for operation of installation equipment.

G. Acceptable Substrates:

1. Level tolerance: Concrete subfloor shall be level with a maximum variation from level of ¼” in 10 feet (6.4 mm in 3.1m). Any irregularity of the surface requiring patching and/or leveling shall be done using Terroxy® Fill and selected aggregates as recommended by Terroxy® Resin Systems.
2. Concrete floor shall be prepared mechanically by shot blasting in accordance with ICRI Guideline No. 03732. Specifically, surface preparation results should achieve a CSP3-CSPS profile.
3. Saw cutting of control joints must be done between 12 and 24 hours after placement of the structural concrete and at a frequency compatible to ACI recommendations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NTMA Standards: Comply with NTMA's "Terrazzo Specifications and Design Guide" and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.

2.2 EPOXY-RESIN TERRAZZO

A. Epoxy-Resin Terrazzo : Comply with NTMA's "Terrazzo Specifications and Design Guide" and manufacturer's written instructions for matrix and aggregate proportions and mixing.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Key Resin Company; Key Epoxy Terrazzo or comparable product by one of the following:

    a. General Polymers Corporation; Terrazzo 1100.
    b. TEC Specialty Construction Brands, Inc.; Tuff-Lite Epoxy Terrazzo.

2. Thickness: 3/8 inch (9.5 mm) nominal.
3. Formulated Mix Color and Pattern: As selected by Architect from full range of industry colors.

B. Materials:

1. Flexible Reinforcing Membrane: Key Resin Co. KR 580 or Manufacturer's resinous membrane for substrate-crack preparation and reflective-crack reduction.
2. Primer: Key Resin Co. KR 502 or Manufacturer's product recommended for substrate and use indicated.
3. Epoxy-Resin Matrix: Key Resin Co. KR 108 or Manufacturer's standard recommended for use indicated and in color required for mix indicated.

    a. Physical Properties without Aggregates:

        1) Hardness: 60 to 85 per ASTM D 2240, Shore D.
        2) Minimum Tensile Strength: 3000 psi per ASTM D 638 for a 2-inch specimen made using a "C" die per ASTM D 412.
        3) Minimum Compressive Strength: 10,000 psi per ASTM D 695, Specimen B cylinder.
        4) Chemical Resistance: No deleterious effects by contaminants listed below after seven-day immersion at room temperature per ASTM D 1308.

            a) Distilled water.
            b) Mineral water.
            c) Isopropanol.
            d) Ethanol.
            e) 0.025 percent detergent solution.
            f) 1.0 percent soap solution.
            g) 10 percent sodium hydroxide.
            h) 10 percent hydrochloric acid.
            i) 30 percent sulfuric acid.
            j) 5 percent acetic acid.

    b. Physical Properties with Aggregates: For resin blended with Georgia white marble, ground, grouted, and cured per requirements in NTMA's "Terrazzo Specifications and Design Guide"; comply with the following:

        1) Flammability: Self-extinguishing, maximum extent of burning 1/4 inch per ASTM D 635.

2) Thermal Coefficient of Linear Expansion: 0.0025 inch/inch per deg F for temperature range of minus 12 to plus 140 deg F per ASTM D 696.

4. Aggregates: Comply with NTMA gradation standards for mix indicated and contain no deleterious or foreign matter. The aggregates shall be signed and blended to achieve the graphic image shown on the Drawings.

   a. Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C 131.
   b. 24-Hour Absorption Rate: Less than 0.75 percent.
   c. Dust Content: Less than 1.0 percent by weight.
   d. Finishing Grout: Resin based.

2.3 STRIP METAL MATERIALS

A. Thin-Set Divider Strips: L-type angle, 1/4 inch deep.

1. Material: Aluminum, 16 gauge.
2. Top Width: 1/8 inch.
3. Mitered corners.

B. Control-Joint Strips: Separate, double L-type angles, positioned back to back, that match material and color of divider strips and in depth required for topping thickness indicated.

C. Custom Cut Letters: Factory cut aluminum letters to match. Thin-set divider strips, set into resinous coating.

2.4 MISCELLANEOUS ACCESSORIES

A. Strip Adhesive: Epoxy-resin adhesive recommended by adhesive manufacturer for this use.

1. Adhesives shall have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Anchoring Devices:

1. Strips: Provide mechanical anchoring devices or adhesives for strip materials as recommended by manufacturer and required for secure attachment to substrate.
2. Precast Terrazzo: Provide mechanical anchoring devices as recommended by fabricator for proper anchorage and support of units for conditions of installation and support.

C. Patching and Fill Material: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.

D. Resinous Matrix Terrazzo Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is biodegradable, phosphate free, and recommended by sealer manufacturer for use on terrazzo type indicated.

E. Sealer: Slip- and stain-resistant, penetrating-type sealer that is chemically neutral; does not affect terrazzo color or physical properties; is recommended by sealer manufacturer; and complies with NTMA's "Terrazzo Specifications and Design Guide" for terrazzo type indicated.

1. Surface Friction: Not less than 0.6 according to ASTM D 2047.
2. Acid-Base Properties: With pH factor between 7 and 10.
3. Sealers shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions, including levelness tolerances, have been corrected.

3.2 PREPARATION

A. Clean substrates of substances, including oil, grease, and curing compounds, that might impair terrazzo bond. Provide clean, dry, and neutral substrate for terrazzo application.

B. Concrete Slabs:

1. Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with terrazzo.

a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
b. Repair damaged and deteriorated concrete according to terrazzo manufacturer's written recommendations.
c. Use patching and fill material to fill holes and depressions in substrates according to terrazzo manufacturer's written instructions.

C. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

1. Moisture Testing: Perform tests indicated below.

    a. In-Situ Probe Test: Perform relative-humidity test using in-situ probes per ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative-humidity-level measurement.
    b. Calcium Chloride Test: Perform calcium chloride test per ASTM F-1869.
    c. Proceed with installation only after substrates have been tested and, subsequently, verified that the moisture vapor emission rate does not exceed that as recommended by the manufacturer at time of installation of the flooring or any future date.
    d. If test results show excessive levels of moisture content or vapor emission rate, apply manufacturer's recommended moisture vapor emission control material based on the highest test readings, Key Resin Co. Key Epocon SL or alternate manufacturer's approved equal.

D. Protect other work from water and dust generated by grinding operations. Control water and dust to comply with environmental protection regulations.

1. Erect and maintain temporary enclosures and other suitable methods to limit water damage and dust migration and to ensure adequate ambient temperatures and ventilation conditions during installation.

E. Coordinate installation timing with the Architect to ensure an on site meeting can be conducted to allow assistance by the Architect for aggregate broadcast for custom "cloud" pattern.

3.3 EPOXY-RESIN TERRAZZO INSTALLATION

A. Comply with NTMA's written recommendations for terrazzo and accessory installation.

B. Mix place, rough grind, grout, cure grout, fine grind, and finish terrazzo according to manufacturer's written instructions and NTMA's "Terrazzo Specifications and Design Guide."

C. Installation Tolerance: Limit variation in terrazzo surface from level to 1/4 inch in 10 feet; noncumulative.

D. Random Crack Detail: For cracks over 1/16" width before surface preparations, fill saw cut with 100% solids epoxy, followed by application of Terroxy® Iso-Crack membrane (40 mils/1.0mm) with fiberglass mesh reinforcement embedded into the membrane. Note: Movement from the substrate may reflect through the finished flooring.

E. Rough Grinding: grind with 24 grit silicon carbide or 24 grit turbo diamonds until all terrazzo strips and marble chips are uniformly exposed.

F. Polishing: Polish with Resin pads or equivalent stones until all grout is removed from surface. Produce surface with a minimum of 70 percent aggregate exposure, and high polished appearance is achieved.

G. Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control-joint strips.

H. Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted.

I. Flexible Reinforcing Membrane:

1. Prepare and prefill substrate cracks with membrane material.
2. Install membrane to produce full substrate coverage in areas to receive terrazzo.
3. Prepare membrane according to manufacturer's written instructions before applying substrate primer.

J. Primer: Apply to terrazzo substrates according to manufacturer's written instructions.

K. Strip Materials:

1. Divider and Control-Joint Strips:

a. Install control-joint strips back to back directly above concrete-slab control joints.
b. Install control-joint strips with 1/4-inch gap between strips, and install sealant in gap.
c. Install strips in adhesive setting bed without voids below strips, or mechanically anchor strips as required to attach strips to substrate, as recommended by strip manufacturer.

2. Perimeter of the compass rosette elements will have an aluminum edge band, with mitered corners.
3. Perimeter of the terrazzo insert will have an aluminum edge band, with mitered corners

L. Aggregate Broadcast: Ensure that the aggregates are broad cast and applied at the density and rates as per the graphic effect per the Drawings. This will be coordinated with the Architect or designated representative on site during the application of the aggregate & background color.

3.4 REPAIR

A. Cut out and replace terrazzo areas that evidence lack of bond with substrate. Cut out terrazzo areas in panels defined by strips and replace to match adjacent terrazzo, or repair panels according to NTMA's written recommendations, as approved by Architect.

3.5 CLEANING AND PROTECTION

A. Cleaning:

1. Remove grinding dust from installation and adjacent areas.

2. Wash surfaces with cleaner according to NTMA's written recommendations and manufacturer's written instructions; rinse surfaces with water and allow them to dry thoroughly.

B. Sealing:

1. Seal surfaces according to NTMA's written recommendations.
2. Apply sealer according to sealer manufacturer's written instructions.

C. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure that terrazzo is without damage or deterioration at time of Substantial Completion.

END OF SECTION 09400

SECTION 09500 – LINEAR ACOUSTICAL METAL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Provisions and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes strip linear metal-wood grained arch'd ceiling and suspension systems for ceilings.

1. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings
2. Perimeter Trim

B. Related Sections include the following:

1. Division 5 Section 05312 Architectural (Acoustial) Ceiling Deck System for structural metal deck and finished acoustical metal ceilings.
2. Division 9 Section "Acoustical Panel Ceilings" for ceilings consisting of mineral-base and glass-fiber-base acoustical panels and exposed suspension systems.
3. Divisions 13, 15, and 16 Sections for light fixtures, sprinklers, and air-distribution components.
4. Products installed, but not furnished, under this Section include the products listed below.
    a. Suspension systems and components for ceilings, other than linear wood ceiling system manufacturer's cliprail system.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire

3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical and Lay-in Panel Ceilings
6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
7. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
8. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
9. ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint
10. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems
11. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
12. ASTM E 1264 Classification for Acoustical Ceiling Products

B. Florida Building Code

C. ASHRAE Standard 62 1 2004 Ventilation for Acceptable Indoor Air Quality

D. NFPA 70 National Electrical Code

E. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures

1.4 QUALITY ASSURANCE

A. Installer Qualifications: The installer must be a firm with a minimum of two (2) years of successful experience in installation of suspended wood ceilings of similar requirements to this project. The installer must be acceptable to Owner and Architect.

B. Fire Performance Characteristics: The wood ceiling boards shall conform to Class 1, or A flame spread rating, when tested according to ASTM E-84.

C. Environmental Standards: The wood ceiling shall originate from well managed forests as certified by accredited and recognized industry certifying organizations.

1.5 PROJECT CONDITIONS

A. Installation shall be done only when the temperature and humidity closely approximate the interior conditions that will exist when the building is occupied. The heating and cooling systems shall be operating before, during, and after installation, with the humidity of the interior spaces maintained between 25% and 55%.

B. There shall be no excessive build up of heat in the ceiling areas.

C. Prior to the start of installation, all exterior windows and doors are to be in place, glazed, and weather-stripped. The roof is to be watertight, and all wet trades' work is to be completed, and thoroughly dry.

D. Mechanical, electrical, and other utility service installations above the ceiling plane shall have been completed. No materials should rest against, or wrap around, the ceiling suspension components or connecting hangers.

1.6 COORDINATION OF WORK

A. Layout and installation of the linear ceiling and its suspension system shall be coordinated with other work penetrating through the ceiling. This includes light fixtures, HVAC equipment, and fire suppression system components.

1.7 SUBMITTALS

A. Product Data: Provide product specifications and installation instructions for all supplied ceiling materials.

B. Shop Drawings: Supply shop drawings showing the placement of hangers, the location of cliprails, and other details pertinent to proper installation.

C. Samples: A 9" wide x 12" long wood sample shall be submitted for approval. The sample shall be made of the wood specie selected, with the selected finish applied; and installed on cliprails.

1.8 DELIVERY, STORAGE, and HANDLING

A. All materials shall be delivered to the project site in the original, labeled, unopened packages.

B. Materials shall be stored flat and level in a fully enclosed space. For a minimum of seventy-two (72) hours immediately prior to ceiling installation, the linear wood strips shall be stored in the room(s) in which they will be installed. The temperature and humidity of the room(s) shall closely approximate those conditions that will exist when the building is occupied. Linear wood strips shall be stored off the floor.

C. Care in handling must be exercised to avoid damage.

1.9 WARRANTIES

A. Manufacturer: All materials supplied by the linear wood ceiling system manufacturer shall be guaranteed against manufacturing defects for one (1) year.

B. Contractor: All work shall be guaranteed for one (1) year from final acceptance of completed work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Manufacturer: Armstrong World Industries

B. Manufacturer shall furnish a suspension cliprail system with attached clips and basis-of-design wood strips necessary to complete installation, in accordance with plans and specifications. The ceiling system is arch'd as indicatd on the drawings. All components required for a finished ceiling system are to be furnished and installed.

1. Acoustical Panels -Wood Grained Finished-Micro Perforated Linear Meal Ceiling:

a. Surface Texture: Smooth

b. Composition: Metal

c. Color: Effects Cherry

d. Size: 4 in x 96 in

e. Edge Profile: Square with extended flange

f. Perforation Option: Round - Diagonal

g. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton 0.70

h. Ceiling Attenuation Class (CAC):

i. Sabin: N/A

j. Articulation Class (AC):

k. Flame Spread: ASTM E 1264; Class A (FM).

l. Light Reflectance (LR) White Panel: ASTM E 1477; 0.61.

m. Dimensional Stability: Standard

n. Recycle Content: Post-Consumer - 0% Pre-Consumer - 25%

q. Acceptable Product: METALWORKS Linear - Classics, 5492 No added formaldehyde as manufactured by Armstrong World Industries

2. Metal Panel Accessories:

1. 5494 - Contrasts Filler Strip
2. XL8945P - 4ft Drywall Cross Tee
3. 5574 Carrier molding

C. All work shall be completed in accordance with the manufacturer's instructions, and in a manner satisfactory to the Owner and Architect.

2.2 SUSPENSION SYSTEMS

A. The suspension system shall consist of manufacturer’s cliprails, installed on #12-gauge wire hangers.

2.3 EDGES, BORDERS, AND PERIMETER TRIMS

A. Edges, borders, and perimeter trims shall be manufacturer’s standard unless indicated otherwise. All wood ceiling products specified shall be supplied by the ceiling manufacturer.

2.4 FINISHES AND COLORS

A. All linear wood strips shall be factory-finished with wood stain to match architect control sample. All finishes shall be selected by the Owner and Architect.

B. Variations in grain, texture, and color – ranging from light to dark – affecting the surface look, will be determined by Owner and Architect.

PART 3 - EXECUTION

3.1 PREPARATION

A. Ceiling Layout: Measure ceiling areas and establish the layout of the hangers and cliprails, in accordance with installation instructions.

B. Coordination: Furnish the layout for supports that shall be installed for suspension of ceilings. Furnish steel deck hanger clips, or similar devices for installation, in time to coordinate the work.

3.2 INSTALLATION

A. General: Install materials in accordance with linear metal ceiling manufacturer’s international printed instructions. Comply with applicable regulations and industry standards.

B. Perimeters: Using a leveling device, lay out and install perimeter trim, as per linear wood ceiling manufacturer's recommendations.

C. Suspensions: Install suspension systems to comply with appropriate industry standards. Locate linear wood ceiling cliprails perpendicular to wood direction, 4" from one wall for the first cliprail, continuing 24" maximum, on center, ending within 4" of the opposite wall.

1. #12-Gauge Wire hangers shall be installed 4' on center, along each cliprail. The wire hangers shall be attached to inserts, screw eyes, or other connecting devices that are secure and appropriate for suspending the ceiling and that will not deteriorate or fail with age or elevated temperatures.

D. HVAC and Light Fixture Suspensions: Electrical and mechanical installations must be supported independently of the linear wood ceiling system.

E. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

F. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.

3.3 ADJUSTING AND CLEANING

A. Make final adjustments to level or contours.

B. Upon completion of ceiling installation, all Linear Metal Strips and borders shall be cleaned free of dirt, dust, grease, oils, and fingerprints.

C. All work that cannot be successfully cleaned or repaired, shall be removed and replaced.

D. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.4 INSPECTION

A. Upon completion of ceiling installation, the Owner and Architect shall inspect all finished surfaces to ensure that the work has been completed in a manner satisfactory to the Owner. Any deficiencies in the installed ceiling system shall be corrected at no additional cost to the Owner.

END OF SECTION 09570

SECTION 09511 – ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes acoustical panels and exposed suspension systems for ceilings.

B. Related Sections:

1. Division 7 Section “Building Insulation” for sound batt insulation.
2. Division 7 Section “Joint Sealants” for sealants.
3. Division 9 Section “Linear Metal Ceilings” for strip linear metal ceilings, and suspension systems for ceilings.

1.3 DEFINITIONS

A. AC: Articulation Class.

B. CAC: Ceiling Attenuation Class.

C. LR: Light Reflectance coefficient.

D. NRC: Noise Reduction Coefficient.

1.4 SUBMITIALS

A. Product Data: For each type of product indicated.

B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Ceiling suspension system members.
2. Method of attaching hangers to building structure.
3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, smoke detectors, Unistrut, Owner Furnished Equipment, sprinklers, access panels, special moldings, and starting point for ceiling layout & grid spacing.
4. Note extent of acoustical clg’s on plan layout.
5. Minimum Drawing Scale: 1/8 inch = 1 foot.

C. Qualification Data: For testing agency.

D. Field quality-control test reports.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.

F. Maintenance Data: For finishes to include in maintenance manuals.

G. MFG's Certifications: Confirmation that light fixtures specified will fit into grid without special clips or hardware.

1.5 QUALITY ASSURANCE

A. Source Limitations:

1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
2. Suspension System: Obtain each type through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:

1. Fire-Resistance Characteristics: Where indicated, provide acoustical panel ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

a. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
b. Identify materials with appropriate markings of applicable testing and inspecting agency.

2. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:

a. Smoke-Developed Index: 450 or less.
b. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.8 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including but not limited to light fixtures, HVAC equipment, fire-suppression system, speakers, smoke detectors, Unistrut, Owner Furnished Equipment and partition assemblies.

1.9 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Deliver to location designated by Owner; obtain signed receipt.
2. Acoustical Ceiling Panels: Full-size panels equal to 3 percent of quantity installed for each acoustical tile utilized (2 boxes minimum labeled by space).
3. Suspension System Components: Quantity of each exposed component equal to 3 percent of quantity installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL PANELS, GENERAL

A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E 795.

B. Acoustical Panel Colors and Patterns: As indicated in Finish Listing.

C. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.3 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING:

A. ACT-1-Basis-of-Design Product (where moisture resistant tile is scheduled): Subject to compliance with requirements, provide the following:

1. Armstrong World Industries, Inc.; "Ceramaguard 605," Square Edge, 2’ X 2’ x

5/8” Prelude XL 15/16” exposed Tee Grid.

B. Color: White.

C. Light Reflectance (LR): Not less than 0.88.

D. Ceiling Attenuation Class (CAC): Not less than 40.

E. Edge/Joint Detail: Square.

F. Antimicrobial Treatment: Humiguard Max.

G. ACT-2-Basis-of-Design Product: Subject to compliance with requirements, provide the following:

2. Armstrong World Industries, Inc.; "Cirrus," High NRC- medium texture, Angled Tegular Edge, 2’ X 2’ x 3/4” except where noted Prelude XL 15/16” exposed Tee Grid.

H. Color: White.

I. Light Reflectance (LR): Not less than 0.85.

J. Noise Reduction Coefficient (NRC): Not less than 0.55.

K. Ceiling Attenuation Class (CAC): Not less than 35.

L. Edge/Joint Detail: Angled Tegular.

M. Antimicrobial Treatment: Broad spectrum fungicide and bactericide based.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

A. Basis-of-Design Product: Subject to compliance with requirements, provide the following:

B. Armstrong World Industries, Inc.; “Prelude XL,” 15/16,” High Recycled Content (HRC), Exposed Tee. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated or required.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635,

Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft tem per.
2. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.1 06-inch diameter wire.

E. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

F. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees. Provide clips where required @ light fixtures to ensure fit & securement within grid.

2.7 ACOUSTICAL SEALANT

A. Products: Subject to compliance with requirements, provide one of the following:

1. Acoustical Sealant for Exposed and Concealed Joints:

a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
b. USG Corporation; SHEETROCK Acoustical Sealant.

B. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

2. Do not proceed with installation until all wet work such as concrete, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans & Architect approved shop drawings. Coordinate panel layout with mechanical and electrical fixtures.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C 636, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, counter-splaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
9. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or post installed anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately, with no visible gaps, into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
2. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
3. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated.

3.5 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09511

SECTION 09651 – RESILIENT FLOOR TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes Composite resilient flooring tile - VCT.

B. Related Sections include the following:

1. Section 09653 “Rubber Wall Bases and Accessories”.
2. Section 09656 “Static Dissipative Resilient Flooring”.

1.3 SUBMITTALS

A. In addition to product data, submit the following.

1. Maintenance data for products specified in this Section, to include in Operating and Maintenance Manual specified in Division 01.
2. Extra Materials: Deliver to Owner not less than one box for each 50 boxes or fraction thereof, of each class, wearing surface, color, pattern, and size of resilient floor tile installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products of the following:

1. Vinyl Composition Tile (VCT)

a. Armstrong World Industries, Inc.
b. Azrock Commercial Flooring, DOMCO
c. Mannington Mills, Inc.
d. Tarkett Inc.

2.2 VINYL COMPOSITION FLOOR TILE

A. Products complying with ASTM F 1066, Composition 1 (nonasbestos formulated), and with requirements specified below:

1. Vinyl Composition Floor Tile Product Data:

a. Class: 2
b. Thickness: 1/8"
c. Size: 12" x 12"
d. Surface: Smooth
e. Color(s): As selected by Architect from manufacturer’s full range.

2.3 CONCRETE SLAB PRIMER

A. Nonstaining type recommended by flooring manufacturer.

2.4 TROWELABLE UNDERLAYMENTS AND PATCHING COMPOUNDS

A. Latex-modified, portland-cement-based formulation provided or approved by tile manufacturer for applications indicated.

2.5 ADHESIVES (CEMENTS)

A. Water-resistant type recommended by tile manufacturer to suit resilient floor tile products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine areas where installation of tiles will occur, with Installer present, to verify that substrates and conditions are satisfactory for tile installation and comply with tile manufacturer's requirements.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 before beginning installation:

C. Comply with manufacturer's installation specifications to prepare substrates indicated to receive tile.

3.2 INSTALLATION

A. Comply with tile manufacturer's installation directions and other requirements indicated.

B. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tile widths at opposite edges of room are equal to one another and are not less than one-half of a tile.

C. Match tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged.

1. Lay tiles with grain running in one direction.

D. Where demountable partitions and other items are indicated for installing on top of finished tile floor, install tile before these items are installed.

3.3 CLEANING

A. Clean resilient tile floors after installation and 4 days prior to date scheduled for inspections intended to establish date of Substantial Completion. Apply protective polish according to floor tile manufacturer's directions.

END OF SECTION 09651

SECTION 09653 - RUBBER WALL BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Resilient base.
2. Resilient molding accessories.

1.3 RELATED SECTIONS

A. Coordinate work of this Section with work of other Sections that are required to properly execute the work and as necessary to maintain satisfactory progress of work of other Sections, including:

1. Section 09650 Rubber Flooring Tile Specification.
2. Section 09651 Resilient Floor Tile – VCT
3. Section 09680 Carpet for metal transition strips at floor material changes.
4. Section 09656 Static Dissipative Resilient Flooring for anti-static flooring

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of product indicated.

C. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.6 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. Mockups: Provide resilient products with mockups specified in other Sections.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.8 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F , in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F .

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. Resilient Base:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following :

a. Johnsonite
b. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
c. Flexco, Inc.
d. Roppe Corporation, USA.

B. Resilient Base Standard: ASTM F 1861.

1. Material Requirement: Type TS (rubber, vulcanized thermoset).
2. Manufacturing Method: Group I (solid, homogeneous).
3. Style: Cove (base with toe) .

C. Minimum Thickness: 0.125 inch.

D. Height: Four inches w/cove base at non-public or back of house areas (Offices, data room, mechanical rooms, storage rooms, etc.) as shown on the Drawings or as scheduled.

1. At public areas of the building (lobbies, hallways, corridors and alcoves adjacent to the public areas, the base shall be Roppe 700 Series or Architect and Owner approved equivalent.

2. Straight edge at carpeted areas and coved bas at non-carpeted and tiled areas or where scheduled or noted on the drawings.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Preformed.

G. Inside Corners: Job formed or preformed.

H. Finish: Matte.

I. Colors and Patterns: As selected by Architect and Owner (or Owner’s designated representative) from Manufacturer’s full range of industry colors.

2.2 RESILIENT MOLDING ACCESSORY

A. Resilient Molding Accessory:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Johnsonite
b. Burke Mercer Flooring Products: Division of Burke Industries, Inc.
c. Flexco, Inc.
d. Roppe Corporation, USA

B. Description: Nosing for resilient floor covering, Reducer strip for resilient floor covering, and Transition strips at all VCT and concrete floor transitions and openings. Refer to Section 09680 “Carpet” for transition strip requirements for carpet termination at flooring material transitions including tiled and non-tiled surfaces.

C. Material: Rubber.

D. Profile and Dimensions: As indicated or specified Owner (or Owner’s designated representative).

E. Colors and Patterns: As selected by Architect and from full range of industry colors.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), except that adhesive for rubber stair treads shall have a VOC content of 60 g/L or less.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates for Resilient Accessories: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.

a. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until they are same temperature as the space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:

1. Inside Corners: Use straight pieces of maximum lengths possible, minimum 1’-0” length.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips where specified or indicated at edges of concrete and resilient floor covering that would otherwise be exposed at flooring transitions and openings.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products until Substantial Completion.

END OF SECTION 09653

SECTION 09656 – STATIC DISSIPATIVE RESILIENT FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Static Dissipative Resilient Flooring for all IT and Data Rooms.

1.3 RELATED SECTIONS

A. Other Division 9 sections for floor finishes related to this section but not the work of this section.

B. Division 3 Concrete; not the work of this section.

C. Division 6 Wood and Plastics; not the work of this section.

D. Division 7 Thermal and Moisture Protection; not the work of this section.

1.4 REFERENCES

A. ASTM International:

1. ASTM E 648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
2. ASTM E 662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
3. ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
4. ASTM F 1066 Standard Specification for Vinyl Composition Tile.
5. ASTM F 1482, Standard Guide to Wood Underlayment Products Available for Use
Under Resilient Flooring.
6. ASTM F 1861 Standard Specification for Resilient Wall Base.
7. ASTM F 1869 Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

8. ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

B. National Fire Protection Association (NFPA):

1. NFPA 253 Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
2. NFPA 258 Standard Test Method for Measuring the Smoke Generated by Solid Materials.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of product indicated.

C. Samples for Verification: For each type of product indicated, in manufacturer's standard-size samples of each resilient product color, texture, and pattern required.

D. Product Schedule: For resilient products: Use same designations indicated on Drawings.

E. Closeout – Closeout Submittals: Submit the following:
1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and precautions against cleaning materials and methods detrimental to finishes and performances.
2. Warranty: Warranty documents specified herein.

1.4 QUALITY ASSURANCE

A. Performance Requirements:
Provide flooring which has been manufactured, fabricated and installed to performance criteria certified by manufacturer without defects, damage, or failure.

B. Administrative Requirements
1. Pre-installation Meeting: Conduct an on-site pre-installation meeting to verify project requirements, substrate conditions, manufacturer’s installation instructions and manufacturer’s warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings) Section
2. Pre-installation Testing: Conduct pre-installation testing as follows: [Specify Testing (i.e. moisture tests, bond test, pH test, etc.)].

C. Responsibility
Single-Source Responsibility: provide types of flooring and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives.

D. Select Installer
Select an installer who is competent in the installation of Armstrong resilient vinyl composition tile flooring.

1. Engage installers certified as Armstrong Commercial Certified Installers.
2. Confirm installer's certification by requesting their credentials.

E. Fire Performance
Fire Performance Characteristics: Provide resilient vinyl composition tile flooring with the following fire performance characteristics as determined by testing material in accordance with ASTM test methods indicated below by a certified testing laboratory or other testing agency acceptable to authorities having jurisdiction:

1. ASTM E 648 Critical Radiant Flux of 0.45 watts per sq. cm. or greater, Class I
2. ASTM E 662 (Smoke Generation) Maximum Specific Optical Density of 450 or l

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery:
Delivery materials in good condition to the jobsite in the manufacturer’s original unopened containers that bear the name of the manufacturer, project identification, and shipping and handling instructions.

B. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures adhesives maintained within range recommended by the manufacturer, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

1.6 PROJECT CONDITIONS

A. Install resilient products after other finishing operations, including painting, have been completed.

B. Maintain ambient temperatures within range recommended by the manufacturer, but not less than 65 deg F (18 deg C) or more than 85 deg F (29 deg C) in spaces to receive resilient products during the following time periods:
1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

C. Maintain the ambient relative humidity between 40% and 60% during installation.

D. Until Substantial Completion, maintain ambient temperatures within range recommended by the manufacturer, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

E. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances. Refer to the manufacturer’s installation manual, on project conditions and requirements.

1.8 WARRANTY

A. Resilient Flooring: Submit a written warranty executed by the manufacturer, agreeing to repair or replace resilient flooring that fails within the warranty period.

B. Warranty Period: 5 years

C. Rights:
The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

D. Validation:
For the Warranty to be valid, this product is required to be installed using the appropriate Armstrong Guaranteed Installation System. Product installed not using the specific instructions from the Guaranteed Installation System will void the warranty.

1.9 MAINTENANCE

A. Extra Materials:
Deliver extra materials to Owner. Furnish extra materials from same production run as products installed. Packaged with protective covering for storage and identified with appropriate labels.
1. Quantity: Furnish quality of flooring units not less than one box for each 50 boxes or fraction thereof of amount installed.
2. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra material.

PART 2 – PRODUCTS

2.1 MANUFACTURERS/PRODUCT DESCRIPTION:

A. Conductive Resilient Flooring: Basis of Design Manufacturer:
Armstrong Flooring Phone: (888) 276-7876
2500 Columbia Avenue
Lancaster, PA 17604
Web: www.armstrongflooring.com

Alternate manufacturers shall products approved by the Architect.

B. Static Dissipative Resilient Tile Flooring: Basis of Design
Static-Dissipative Resilient Tile Flooring with the following physical characteristics:

1. Complies with requirements for ASTM F 1700 Standard Specification for Solid Vinyl Tile.
2. Backing coated with pure carbon for increased and consistent conductivity.
3. Tile size: 24" X 24" (61 X 61 cm).
4. Wear layer/Overall thickness: .080" (2.0 mm).
5. ASTM D 2047, Standard Test Method for Static Coefficient of Friction of Polish- Coated Flooring of 0.5 or greater.
6. ASTM F 970, Standard Test Method for Static Load Limit – 250 PSI.
7. ASTM E 648, Standard Test method for Critical Radiant Flux of 0.45 watts/cm^2 or greater, Class I.
8. ANSI/ESD S7.1: 7.5×10^8, 12% RH, tested surface to ground
9. Meet OSHA/NFPA (> 2.5×10^4 ohms): 6.2×10^7 ohms.
10. Meet ASTM F 150, 10^6 to 10^9 ohms (50% RH, 100v): 6.2×10^7 ohms
11. ESD-approval (IEC 61340 / 100v): 10^7.
12. Manufacturer offers a RESTART reclamation program for returning jobsite scrap.
13. Contains 25% pre consumer recycled content.
14. Phthalate-free *(except for recycled materials).*
15. 100% Recyclable.
16. Color to be selected by Architect from manufacturer's full range of colors.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic-cement-based formulation.

B. Adhesives: As recommended by manufacturer to meet site conditions.

1. Conductive adhesive.
2. Copper grounding strips.

2.3 ACCESSORIES

A. Patching:
For patching, smoothing, and leveling monolithic subfloors (concrete, terrazzo, quarry tile, ceramic tile, and certain metals), provide Manufacturer's approval Fast-Setting Cement-Based Patch and Underlayment.

B. Sealing:
For sealing joints between the top of wall base or integral cove cap and irregular wall surfaces such as masonry, provide plastic filler applied according to the manufacturer's recommendations.

C. Transition:
Provide transition/reducing strips tapered to meet abutting materials.

D. Resilient Edge Strips:
Provide resilient edge strips of width shown on the drawings, of equal gauge to the flooring, homogeneous vinyl or rubber composition, tapered or bullnose edge, with color to match or contrast with the flooring, or as selected by the Architect from standard colors available.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the work. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer written instruction to adhesion of Conductive Resilient Flooring.
1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate paint, coatings and other substances that are incompatible with adhesives or contain soap, wax, oil, solvents, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Mechanically remove contamination on the substrate that may cause damage to the Conductive Resilient Flooring material. Permanent and non-permanent markers, pens, crayons, paint, etc., must not be used to write on the back of the flooring material or used to mark the substrate as they could bleed through and stain the flooring material.
4. Prepare Substrates according to ASTM F 710 including the following:

a. Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
1) Perform anhydrous calcium chloride test, ASTM F 1869. Results must not exceed 5 lbs. Moisture Vapor Emission Rate per 1,000 sq. ft. in 24 hours.

–
or
–

2) Perform relative humidity test using in situ probes, ASTM F 2170. Must not exceed 80%.

b. A pH test for alkalinity must be conducted. Results should range between 7 and 9. If the test results are not within the acceptable range of 7 to 9, the installation must not proceed until the problem has been corrected.
c. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.

B. Fill cracks, holes, depressions and irregularities in the substrate with good quality Portland cement based underlayment leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

C. Floor covering shall not be installed over expansion joints.

D. Do not install resilient products until they are same temperature as the space where they are to be installed.
1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOORING INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient sheet flooring.

B. Conductive Resilient Flooring:

1. Install with manufacturer’s approved adhesive as recommended in manufacturer Installation:
a. Instructions and specified for the site conditions and follow adhesive label for proper use.
2. Install with manufacturer’s approved copper grounding strips per the manufacturer’s installation instructions.
3. Roll the flooring in both directions using a 100 pound three-section roller.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

1. No traffic for 24 hours after installation.
2. No heavy traffic, rolling loads, or furniture placement for 72 hours after installation.

D. Wait 72 hours after installation before performing initial cleaning.

E. A regular maintenance program must be started after the initial cleaning.

END OF SECTION 09656

SECTION 09672 – RESINOUS FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes chemical moisture resistant aliphatic urethane epoxy flooring for the following applications:

1. Hangar floor.

1.3 RELATED SECTIONS

A. Division 3 Sections “Cast-in-Place Concrete and Concrete Curing”

1.4 REFERENCES

A. ASTM C579, Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

B. ASTM D2240, Standard Test Method for Rubber Property—Durometer Hardness.

C. ASTM D2369, Standard Test Method for Volatile Content of Coatings.

D. ASTM D4060, Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.

E. ASTM D4541, Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.

F. For additional standards please refer to Product Data Sheets

1.5 SUBMITTALS

A. Product Data: For each product indicated, including physical properties and colors available.

B. Shop Drawings: Show extent of each floor coating. Include details for treating substrate joints and cracks, and other termination conditions. Include layout of traffic striping and markings.

C. Samples: For each type of coating required, prepared on rigid backing. Provide stepped samples on backing large enough to illustrate build-up of coatings.

D. Material certificates and Installer certifications. Provide list of 5 completed projects of similar size and complexity utilizing coating system.

E. Maintenance data and instructions, including procedures for stain removal, surface repair and cleaning.

F. Compatibility Statement / Certification: Manufacturer's compatibility statement that epoxy flooring bonding surfaces and materials are acceptable surfaces for the proposed flooring coating and surfaces preparation requirements, including priming, moisture content and cleaning surfaces preparation criteria.

1.6 QUALITY CONTROL

A. Installer (Applicator) Qualifications: Applicator who is certified by manufacturer.

1. Pre-Qualification: Each bidder for this project shall be pre-qualified and approved in writing by the material manufacturer.

2. Experience: Minimum 5 years' experience on projects of similar size and complexity. Contractor shall submit a list of five projects of similar size, scope and complexity.

B. Source Limitations: Use traffic coatings of a single manufacturer.

C. Mock-Up:

1. Construct one 100 sq.ft. (10 sq.m.) mock-up of each type and color of resinous flooring in location acceptable to Architect/Engineer to demonstrate quality of finished system, complying with manufacturer's instructions.

2. Arrange for Architect/Engineer's review and acceptance, obtain written acceptance before proceeding with Work.

3. Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section. Mock-up shall be left in place for the duration of the work.

D. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 prior to installation of the concrete slab.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site in manufacturer's original and unopened containers and packaging, with labels clearly identifying product name, batch or lot number, and date of manufacture.
   1. Material should be delivered to job site and checked for completeness and shipping damage prior to job start.

B. Storage:
   1. Store materials in accordance with manufacturer's written instructions.
   2. Keep containers sealed until ready for use. Material should be stored in a dry, enclosed, protected area from the elements.
   3. Do not subject material to excessive heat or freezing.
   4. Shelf life: Established based on manufacturer's written recommendation for each material being used.

C. Condition materials for use according to manufacturer's instructions for 24 hours (minimum) prior to application.

D. Handling: Protect materials during handling and application to prevent damage or contamination.

E. Record material lot number and quantity delivered to jobsite/storage.

1.8 PROJECT CONDITIONS

A. Do not install the Work of this Section outside of the following environmental ranges without Manufacturers' written acceptance:
   1. Material Temperature: Precondition material for at least 24 hours between 65° to 75°F (18° to 24°C)
   2. Ambient Temperature: Minimum/Maximum 50˚/85˚F (10˚/30˚C)
   3. Substrate Temperature: Minimum/Maximum 50˚/85˚F (10˚/30˚C). Substrate temperature must be at least 5˚F (3˚C) above measured Dew Point.
   4. Mixing and Application attempted at Material, Ambient and/or Substrate Temperature conditions less than 65˚F (18˚C) will result in a decrease in product workability and slower cure rates.
   5. Relative Ambient Humidity: Minimum ambient humidity 30%, maximum ambient humidity 75% (during application and curing)
   6. Measure and confirm Substrate Moisture Content, Ambient Relative Humidity, Ambient and Surface Temperature and Dew Point.

B. Substrate moisture:
   1. Moisture content of concrete substrate must be ≤ 4% by mass as measured with a Tramex® CME/CMExpert type concrete moisture meter.
   2. Additionally, relative humidity tests may be conducted per ASTM F2170 and values must be ≤ 85%.
   3. If moisture content of concrete substrate is > 4% by mass as measured with Tramex® CME/CMExpert type and/or if relative humidity tests per ASTM F2170

exceed values > 85%, consider moisture mitigation systems or moisture tolerant primer.

C. Maintain constant ambient room temperature of plus or minus 15ºF (plus or minus 7ºC) with a minimum temperature of 50ºF (10ºC) and maximum temperature of 85ºF (30ºC). Maintain constant ambient room temperature for 48 hours before, during and after installation, or until cured. Do not apply while ambient and temperatures are rising.

D. Erect suitable barriers and post legible signs at points of entry to prevent traffic and trades from entering the work area during application and cure period of the floor.

E. Ensure adequate ventilation and air flow.

1.9 WARRANTY

A. Manufacturer’s warranty covering the resinous flooring against defects in materials for one year from date of installation.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace epoxy floor coating that fails in materials and workmanship within five years from date of Substantial Completion.

1. Warranty does not include deterioration or failure due to unusual weather phenomena, failure of prepared and treated substrate, formation of new substrate cracks exceeding 1/16 inch in width, fire, vandalism, or abuse by maintenance equipment, and truck traffic.
2. Failure includes, but is not limited to, the following:

a. Adhesive or cohesive failures.
b. Abrasion or tearing failures.
c. Surface crazing or spalling.
d. Intrusion of water, oils, gasoline, grease, salt, or acids into substrate.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Material Compatibility: Provide primers; base, intermediate, and top coats; and miscellaneous materials that are compatible with one another and with substrate under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
1. All materials must come from single manufacturer.

B. VOC Content: Provide materials that comply with VOC content limits established by ASTM D2369-07.

2.2 EPOXY FLOOR COATING

A. Basis-of-Design Product: The design for the hangar floor coating is based on the products indicated below, installed for a complete system. Products by other listed manufacturers may be considered provided deviations from specifications of the product named are minor as judged by the Architect.
   1. Primer: Sikafloor 161 is a two part, epoxy resin for priming and leveling mortars with the following properties:
      a. Pull-off Strength (ASTM D4541): > 400 psi (2.7 MPa) with 100% concrete failure.
      b. Shore D Hardness (ASTM D2240): 76 at 7 days.
      c. Solid Content: ~ 100% (by volume) / ~ 100% (by weight).
      d. VOC Content (ASTM D2369): ≤ 50 g/L.
      e. Permeability (ASTM E96): 9.0 g/m² (24 hours / +75°F).
      f. Water Absorption (ASTM D570): 0.14 g/h - m2.
      g. Viscosity (approximately) of Components A + B: 775 (SP2/100).
   2. Body Coat and Top Coat: Sikafloor 264 is a pigmented two part, low viscosity, self-priming, epoxy coating binder in [*Refer to Sikafloor color chart*] color with the following properties:
      a. Pull-off Strength (ASTM D4541): > 400 psi (2.7 MPa) with 100% concrete failure.
      b. Shore D Hardness (ASTM D2240): 76 at 7 days.
      c. Solid Content: ~ 100% (by volume) / ~ 100% (by weight).
      d. VOC Content (ASTM D2369): ≤ 50 g/L.
      e. Compressive Strength (ASTM C579): 7,250 psi (50 N/mm²) at 28 days.
      f. Flexural Strength (ASTM C580): 2,900 psi (20 N/mm²) at 28 days.
   3. Slurry Aggregate: Sikadur-504.
   4. Broadcast Aggregate: Sikadur-508.
      a. Furnish and evenly distribute as required to achieve a slip-resistant finish.

B. Top Coat: Sikafloor 316N is a high solids, low VOC abrasion resistant, aliphatic polyurethane coating of Architect-selected color from full range of manufacture's colors, with the following properties:

   1. Pull-off Strength to Primed Concrete (ASTM D4541): > 400 psi (2.76 MPa) with 100% concrete failure.

   2. Hardness (ASTM D 3363 Pencil): 2H to 3H concrete failure.

   3. VOC Content (ASTM D2369): With Wear Aggregate ≤ 89 g/L

   4. Tensile Strength (ASTM D638): 4,641

   5. Elongation: 85%

   6. Abrasion Resistance (ASTM D4060): 18 mg (CS-17 Wheel, 1000 gm load, 1000 cycles).

   7. Coefficient of Friction ANSI 326.3 = .56

C. Aggregate: Uniformly graded washed silica sand of particle sizes, shape, and minimum hardness recommended in writing by coating manufacturer.

1. Spreading Rate: As recommended by manufacturer for substrate and service conditions indicated, but not less than the following:

a. Top Coat: As required to achieve slip-resistant finish.

2.3 MISCELLANEOUS MATERIALS

A. Joint Sealants: Multicomponent urethane sealant recommended in writing by manufacturer for substrate and joint conditions indicated and for compatibility with epoxy floor coatings; complying with ASTM C 920.

PART 3 - EXECUTION

3.1 EXAMINATION

A. General: Comply with manufacturer's written recommendations.

B. Verify compatibility with and suitability of substrates and that substrates are visibly dry and free of moisture.

1. Application of coating indicates acceptance of surfaces and conditions.

C. Concrete Substrates: Begin coating application only after minimum concrete curing and drying period recommended by epoxy floor coating manufacturer has passed and after surfaces are dry.

1. Test for moisture by method recommended in writing by manufacturer at multiple locations within area to be coated.
2. Apply temporary moisture barrier if test results exceed acceptable application requirements.

D. Mechanical abrasion produces a uniform substrate that is generally in acceptable condition to receive coatings. See "ASTM C 1127 Requirements" Article in the Evaluations.

E. Examine surfaces to receive flooring system. Notify Architect, General Contractor and Owner if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected. Do not apply to substrate treatments for moisture, repair, or leveling not of the same Manufacturer.

F. Surface must be clean, sound and dry. Remove dust, laitance, grease, curing compounds bond inhibiting impregnations, waxes and any other contaminants. All projections, rough spots, etc. should be dressed off to achieve a level surface prior to the application.

G. Concrete substrate to have a minimum compressive strength of 3,500 psi (24 MPa) at 28 days and a minimum of 215 psi (1.5 MPa) in tension at time of application.

H. Substrate moisture:

1. Measure and confirm Substrate Moisture Content, Ambient Relative Humidity, Ambient and Surface Temperature and Dew Point.

2. Confirm and record above values at least once every 3 hours during installation, or more frequently whenever conditions change (e.g. Ambient Temperature rise/fall, Relative Humidity increase/decrease, etc.).

I. Ensure concrete substrate conforms to the minimum requirements of the flooring manufacturer.

J. Flooring system shall not be applied to sand-cement setting beds. Sand-cement beds shall be removed to structural concrete substrate and re-leveled/sloped as necessary to achieve grade and/or adequate drainage.

K. Flooring system shall not be applied to asphaltic or bitumen membranes, soft wood, aluminum, copper or fiberglass reinforced polyester/vinyl ester composites.

L. Application to glazed or vitrified brick and tile, structural wood, steel shall only be permitted with Manufacturer’s written recommendation.

3.2 SURFACE PREPARATION

A. Prepare surface to receive flooring systems in accordance with manufacturer's written instructions.

B. Remove dirt, oil, grease, wax, laitance, curing compounds, water-soluble concrete hardeners, and other surface contaminants. Remove sealers, finishes, and paints. Remove unsound concrete by appropriate mechanical means.

C. Concrete: Shall be cleaned and prepared to achieve laitance-free and contaminant-free, open textured surface by shot blasting or equivalent mechanical means (CSP level as per ICRI guidelines and manufacturer’s written recommendation).

D. Chemical Surface Preparation: Chemical surface preparation (acid etching) is unacceptable and will void Manufacturer’s warranty.

E. Control joints and cracks: Provide repair and treatment of control joints and surface cracks utilizing manufacturer’s standard materials and installation details. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D 4258.

F. Mask adjoining surfaces not receiving floor coating including floor drains, hangar door rails and other substrate penetrations to prevent spillage, leaking, and migration of coatings.

G. Prepare, treat, rout, and fill joints and cracks substrates. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D 4258.

H. Start epoxy floor coating application in presence of manufacturer's technical representative.

1. Verify that wet film thickness of each component coat complies with requirements every 100 sq. ft.
2. Prevent contamination and damage during application and curing stages.

3.3 APPLICATION

A. Mix and apply material with strict adherence to manufacturer’s written installation procedures and coverage rates.

B. Follow Manufacturer’s written recommendations on terminations and connections to walls, drains, doorways, columns, and floor-to-floor transitions.

C. Do not apply while ambient and substrate temperatures are rising.

D. Apply resinous flooring with care to ensure that no laps, voids, or other marks or irregularities are visible, and with an appearance of uniform color, sheen and texture, all within limitations of materials and areas concerned.

E. Match colors and textures of approved samples.

F. Install cove base 4” high with a coved-radius in accordance with manufacturer’s written instructions.

3.4 CLEAN UP

A. Disposal of this product, solution and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

B. Empty containers should be taken to an approved waste handling site for recycling or disposal.

3.5 PROTECTION

A. Freshly applied material should be protected from dampness, condensation, and water for at least 72 hrs.

B. Beware of air flow and changes in air flow. Introduction of dust, debris, and particles, etc. may result in surface imperfections and other defects.

C. Follow manufacturer’s written recommendation with respect to cure, wait time and return to service.

END OF SECTION

SECTION 09681 – CARPET TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes modular carpet tile at walk off areas of the entries or as scheduled.

B. Related Requirements:
1. Division 9 Section "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
1. Review methods and procedures related to carpet installation including, but not limited to, the following:
   a. Review delivery, storage, and handling procedures.
   b. Review ambient conditions and ventilation procedures.
   c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

A. Product Data: For the following, including installation recommendations for each type of substrate:
1. Carpet: For each type indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance.

1.5 SUBMITTALS

A. Product Data: For each product indicated.

B. Samples: For each carpet, and exposed accessory and for each color and pattern required.

C. Maintenance data.

D. Layout drawings at 1/8” scale minimum.

E. Dyelots: All carpet of the same type in continuous areas should be from the same dye lots.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

1.8 PROJECT CONDITIONS

A. General: Comply with CRI 104, Section 6.1, "Site Conditions; Temperature and Humidity."

B. Environmental Limitations: Do not install carpet until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

C. Do not install carpet over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by manufacturer.

D. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

E. Do not install carpet over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by carpet manufacturer.

F. Where demountable partitions or other items are indicated for installation on top of carpet, install carpet before installing these items.

1.9 WARRANTY

A. Carpet Warranty: Provide manufacturer’s standard form in which manufacturer agrees to replace carpet that does not comply with requirements or that fails within ten (10) years from date of Substantial Completion. Warranty does not include deterioration or failure of carpet from unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.

1.10 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet to include in maintenance manuals. Include the following:

B. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.

C. Precautions for cleaning materials and methods that could be detrimental to carpet.

1.11 EXTRA MATERIALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. Carpet tile attic stock shall be provided in original shipping boxes or wrapping and labeled for each area of use/installation.

2. Deliver all required overages and maintenance stock to Owner’s specified location prior to beginning installation. Attic stock shall be from the same dye lot as installed material.

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Basis-of-Design Product: Subject to compliance with requirements, provide Milliken Floor covering, or comparable product by one of the following:

1. Shaw.
2. Tandus.

B. Color and Pattern:
1. As scheduled and shown on the drawings or as selected by the Architect and Owner.

C. Pile Characteristic:
1. Milliken-Certified Wearon – Tufted-textured loop; 14.4 stitches/ inch

D. Primary Backing/Backcoating: PVC-Free WellBAC™ Comfort Cushion

E. Secondary Backing: Manufacturer's standard fiberglass reinforced thermo plastic composite material.

F. Size: 19.7 inches by 19.7 inches.

G. Stain Resistance/Soil Release: Soil and stain resistance shall be integral to carpet fiber or shall be applied per manufacturer standards.

H. Static Control: 3.5 KV when tested under Standard Shuffle test (70 degrees, 20% RH)

I. Flammability:

1. DOC-FF-1-70 Pill Test: Self Extinguishing.

2. Floor Radiant Panel: Meets NFPA Class 1 when tested per ASTM-E-648 glue down.

J. NBS Smoke Chamber NFPA 258: Less than 450 Flaming Mode.

K. Color Fastness:

1. Lightfastness - AATCC 16E-1982 - Dark color: Gray scale rating of 4.0 or better after 80 standard fading hours as compared to AATCC Gray Scale for evaluation change in color.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Edge/Transition Strips: Johnsonite – Vinyl “C” or “D” adaptor, or “T” molding for transition between carpet and flooring material transition, or extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints. Carpet to be flush with adjoining tile surface.

1. Schluter – “Reno-T” at equal height flooring transitions.

2. Schluter – “SCHIENE” at carpet to tile transitions.

3. Johnsonite CTA-XX-J 1/4” high x 2½” at perimeter of carpet tile, with mitered corners, between transition of polished concrete and carpet.

or

3. Johnsonite EG-XX-H 1/4” high x 2⅛” at perimeter of carpet tile, with mitered corners, between transition of hard surface, vinyl tile or sealed concrete.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
2. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
3. Raise subfloors at lobby areas to ensure the carpet is flush with finish floor of tile.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. General: Do not start work until work of other trades are substantially completed. Inspect surfaces to receive carpet and verify that all such work is complete to the point where this installation may properly commence. In the event of discrepancy, notify the Contractor. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved. Start of carpet installation indicates acceptance of subfloor conditions and full responsibility for completed work.

E. Materials: Inspect all goods to verify all goods uniformity, quality, color and texture against the approved samples prior to installation. Any discrepancy should be brought to the attention of the Contractor.

3.2 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions. Sequence tile installation per manufacturer's instructions to ensure a uniform appearance.

B. Installation Method: As recommended in writing by carpet tile manufacturer.

C. Maintain dye lot integrity. Do not mix dye lots in same area.

D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

G. Install pattern parallel to walls and borders.

H. Roll floor with 75 to 100 pound roller per manufacturer's requirements.

I. Blend and enhance the seams, and trim face yarn as required.

J. General: In addition to the requirements and recommendations of the Carpet Manufacturer, the following criteria shall be adhered to:

1. Installation layout shall enable future replacement, especially in large open areas and traffic paths, unless specifically indicated in writing by owner or owner's representative.
2. No carpet tile pieces smaller than 6" in width or length shall be used.
3. Seams occurring at doors of different types of carpet shall be parallel to closed door, and be centered directly under the closed door.
4. Flooring Trade Contractor is responsible for trimming all loose yarn and fuzzy edges of carpet tiles.
5. All cutting of carpet for telephone and electrical outlets shall be the responsibility of the Flooring Trade Contractor.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove and dispose of debris and unusable scraps.

3. Vacuum carpet using two motor, top loading, upright commercial machine with brush-only element, utilizing a high filtration dust bag. Remove spots in accordance with carpet manufacturer's guidelines and replace carpet where spots cannot be removed. Remove any protruding face yarn using sharp scissors. Be certain to trim any loose yarns or fibers at all seams.
4. Following cleaning and vacuum, carefully protect the carpeting from soiling and damage until final acceptance. Protection shall be accomplished by using approved protection paper. Edges shall be lapped 6 inches and secured with non-asphaltic tape. Covering shall be kept in repair and damaged portions replaced during the construction and move-in period.
5. Maintenance Materials: Deliver usable, uncut carpet tiles to Owner's designated storage space, properly packaged and identified. Dispose of smaller pieces as construction waste.

B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations".

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09681

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SECTION 09700 – GRAPHIC MURAL WALL FINISHES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 Summary

A. Section Includes: Pre--engineered graphic mural wall system including wall panels, mounting extrusions, bases and frame. Wall system comes “ready to install” with fasteners, adhesives, and other materials required for a complete assembly. Fasteners shall be concealed type.

B. Related Sections:

1. Section Rough Carpentry

1.3 References

A. ASTM E84 – Surface Burning Characteristics of Building Materials.

1.4 Submittals

A. Provide submittals in accordance with Section– Submittal Procedures.

B. Submit manufacturer’s shop drawings, installation drawings, installation instructions and maintenance instructions, including images, sizes of panels, glass joints, and photographic proofs and image blocking.

C. Submit environmental impact data for all materials.

D. Submit samples no less than 4" x 4" for all specified material finishes.

E. Submit panel edge extrusion samples no less than 4” of specified finish.

F. Submit mock--up of wall system and photographic image no less than 12” x 12”.

G. Manufacturer information:

1. Provide overview literature describing manufacturer’s overall scope of products and manufacturing capabilities.
2. Provide URL for manufacturer’s web site; web site must provide access to technical data, images and general product information.
3. Cleaning and maintenance data.

1.5 Quality Assurance

A. Manufacturer Qualifications

1. Minimum 10 years’ experience in the manufacture of architectural surface materials.
2. Minimum 10 years’ experience in the fabrication of wall systems.

3. Provide reference list of at least 20 public space projects currently using walls fabricated by the manufacturer.

B. Installer Qualifications

1. Minimum three years' experience in the installation of wall systems.

1.6 Delivery, Storage and Handling

A. Deliver materials to installation site in manufacturer's original packaging. Handle products in accordance with manufacturer's instructions. Store in dry, secure location, protected against direct sunlight and excessive heat. Protect finished surfaces with strippable film.

1.7 Warranty

A. Provide manufacturer's standard warranty.

1. Warranty terms: two years against defects in materials and workmanship.

Part 2 PRODUCTS

2.1 Manufacturer

A. Basis of Design Custom Photographic Image-Glass Wall System manufactured by:

1. Skyline Design Architectural Glass & Products
2. Contact: Dale Ginger
   1240 N. Homan
   Avenue
   Chicago, IL 60651
   Phone: 773-208-6400
   Fax: 773-278-3548
   or, Architect and other approved equal

2.2 Wall Panels

A. General

1. Provide interlocking grid panel system with inset panels mounted to extruded aluminum frames on structural backer. The recommended substrate is 3/4″ fire rated plywood.
2. Panel configuration: Wall System (standalone panel and Custom Photographic Image Glass Wall Systems) with Minimal style panel frames. Reference drawings for panel layout and reveal spacing.
3. Provide inset panels in the finishes specified.
4. Weight per square foot: average 2.40 lbs. to 3.04 lbs.
5. Frames are extruded aluminum.
6. Panels shall have an ASTM E84, class A flame spread rating.
7. Panels shall not harbor bacteria and shall withstand use of disinfectants.

B. Inset Materials

1. Laminated Glass Panels

a. Material: PPG Starfire glass comparable to UL 723, ANSI/NFPA No. 255, and UBC No. 8--1.

C. Base

1. a. Stainless Steel Panels

b. Material: Stainless Steel.

D. Panel Frames and Outside Corner Extrusion

1. Material: Extruded, anodized aluminum
2. Finish: Clear

E. Reveals

1. Material: Extruded, anodized aluminum
2. Finish: Black

Part 3 EXECUTION

3.1 Preparation

A. Protect wall finishes, fixtures and equipment from damage caused by work of this Section.

3.2 Installation

A. Install in accordance with wall system manufacturer's instructions.

3.4 Cleaning and Protection

A. Remove strippable film. Clean exposed surfaces in accordance with manufacturer's instructions.

B. Protect exposed surfaces from damage by subsequent construction.

END of SECTION 09700

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SECTION 09911 – EXTERIOR PAINTING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surface preparations, painting, and finishing of exposed exterior items and surfaces.

1. Surface preparation, priming and finish coats specified in this Section are in addition to shop priming and surface treatment specified under other Sections.

B. Paint exposed surfaces whether or not colors are designated in “schedule” except where a surface or material is indicated not to be painted or is to remain natural. Where an item or surface is not mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect and Owner will select from standard colors or finishes available.

1. Painting includes field painting exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.

C. Painting is not required on pre-finished items, finished metal surfaces, concealed surfaces, operating parts, or labels.

1. Labels: Do not paint over Underwriter’s Laboratories, Factor Mutual or other code-required labels, or equipment name, identification, performance rating, or nomenclature plates.

D. The Contractor shall apply damp proofing to the interior face of the perimeter new exterior CMU (where walls are to be concealed) walls to reduce moisture intrusion during the course of construction, until the final exterior paint system is applied.

E. Non-Galvanized Structural Steel to receive fire proofing as scheduled, shown, or required by the FBC, shall be primed by the fabricator but not finished painted.

F. Coating Maintenance Manual: upon conclusion of the project, the Contractor or paint manufacture/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams “Custodian Project Color and Product Information” report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages,

Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.3 GENERAL

A. Furnish all labor, materials, tools, equipment, etc. and services necessary and incidental to the complete fabrication, furnishing and erection of this Section as shown, noted, detailed and reasonably implied on the drawings and in the specifications.

B. Note that warranty requirements are an integral part of the work in this Section and all criteria listed per Article 1.9 of this Section apply.

C. Note that the requirement for prime and finish painting may be included in various Mechanical, Electrical, Plumbing, Fire Protection, and Structural sections of this specification. Coordination is required.

D. The Paint Manufacturer shall also provide their own company paint and coatings specifications accompanied by Product Data and Material Safety Data sheets as part of Article 1.6 Submittals below. It is the intent of these Specifications to establish quality and workmanship detail, and define both generic systems and the extent of the caulking and coatings applications in a general way. It shall then be the responsibility of the Paint Manufacturer to attach and comply with their own company paint and coatings specifications for the precise primers and finish coats and application procedure and methods to ensure this criteria is followed.

E. In the event of discrepancy, the Paint Manufacturer’s specifications shall take precedence over these specifications. Notify the Architect in writing for each and every specific situation as it occurs prior to application of any material.

F. The Paint Manufacturer shall exercise rights of approval in the selection of a competent applicator, which meets their standards for quality workmanship and levels of experience.

G. Although the Paint Manufacturer may not actually manufacture caulking compounds equivalent to these specified herein, they shall be responsible for this phase of work as described in Article1.9 of this Section.

1.4 RELATED SECTIONS

A. Coordinate work of this Section with work of other Sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other Sections, including:

1. Division 5 Section “Metal Fabrications” for shop priming ferrous metal.
2. Division 7 Section “Sprayed Fire-Resistive Materials.”
3. Division 8 Section “Steel Doors and Frames” for shop priming steel doors and frames.
4. Division 9 Section “High Performance Coatings”

1.5 DEFINITIONS

A. “Paint” includes coating system materials, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

1.6 SUBMITTALS

A. Data: Submit product data under provisions of Section 01300 – Shop Drawings, Product Data and Samples to include the Paint Manufacturer's application instructions for all products intended for work in this Section.

B. Painting Schedule: Shall include, but not limited to the following:

1. Pretreatment requirements for each paint system.

2. Spread Rate - gallons per square foot.

3. Wet film thickness in mils.

4. Dry film thickness in mils.

5. Total dry film thickness in mils.

6. Format identical to Article 3.9 PAINT SCHEDULE

C. Samples:

1. Submit manufacturer's standard color chips. Architect and Owner will select colors from manufacturer's color chip brochures. Contractor to prepare color chip samples specified herein before using selected colors. Architect and Owner will make final selection from such color chips and prepare color schedule for Contractor's use.

2. Do not proceed with any painting work until field sample panels of each paint system specified are applied and reviewed by the Architect and Owner.

D. Applicator Certification: Written acceptance of the applying company per Article 1.9 D. of this section.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Section 01600 – Materials and Equipment and Section 01620 – Storage and Protection.

B. Deliver all materials to the job site in original, new and unopened packages and containers bearing the manufacturer's name and label, and the following

information:

1. Product name or title of material,

2. Product description (generic classification or binder type).

3. Manufacturer's name, stock number and date of manufacture.

4. Contents by volume, for major pigment and vehicle constituents,

5. Thinning instructions,

6. Application instructions,

7. Color name and number,

8. No materials other than types specified or approved may be delivered to project site. Unapproved materials shall be removed from project site immediately.

C. Storage and Use of Premises:

1. The applicator shall confine his apparatus, materials storage and operations of his workers to limits indicated by Contractor. All materials used on the job shall be stored in a single place designated by the Contractor. Such storage shall be kept clean and the applicator shall be liable for damage to surrounding areas.

2. Inflammable material and/or fire hazard waste shall be stored, handled and used in an approved manner and shall be removed from the site daily.

D. Store materials not in use in tightly covered containers in a well ventilated area at a minimum ambient temperature of 45 degrees F., or as required by the manufacturer. Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

2. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.8 JOB CONDITIONS

A. Paint only in dry weather when temperature is 50 degrees F or higher. Stop exterior work early to permit paint film to set up before condensation, caused by night temperature drops, occur. Do not begin painting until surfaces are moisture free.

B. Do not varnish or enamel in direct sunlight.

C. Keep paint at room temperature.

D. Sweep dust, dirt and debris away before painting.

E. Execute work in accordance with label directions. Coating applications shall be made in strict conformance to this specification and to the manufacturer's paint instructions on the labels and product data sheets.

F. Paint only dry wood (less than 15 percent moisture). Defer painting until moisture content meets manufacturer's recommendations.

G. Environmental Requirements:

1. Measure moisture content of surfaces using an electronic moisture meter. Do not apply coating unless moisture content of surfaces is below the manufacturer’s recommendations.

2. Paint PH tests shall be taken prior to painting subcontractor beginning his work. PH level to be acceptable to paint manufacturer and subcontractor prior to paint application. Costs of tests to be paid by painting contractor. Provide written documentation of all test results immediately to on-site General Contractor’s superintendent.

3. Strictly follow manufacturer’s recommendations pertaining to environmental conditions.

H. All work shall be accomplished by skilled workmen familiar with and trained to do this type of work and they shall be further qualified to operate or use the equipment and rigging needed to accomplish this work.

I. Materials shall be applied evenly and free of runs, sags, or pinholes.

J. Type and amount prescribed for thinners, solvents, cleaners, etc. to be confirmed by and based on the Paint Manufacturer's written recommendation and approval.

K. All application tools and equipment shall be in good working order and suitable for proper application. All surrounding areas shall be fully protected against damage during each stage of the painting project. All exterior and interior substrates designated not to receive paint coatings shall be kept free of paint residue, e.g. windows, etc.

L. Normal safety signs, necessary lighting and temporary fencing around work areas shall be installed and maintained in accordance with OSHA requirements while work is in progress.

M. Where spray painting has been approved by the Architect, this applicator shall protect all adjacent materials and surfaces by covering entire said areas with approved protective materials. Overspray will not be accepted and, if it occurs,

shall be cleaned up properly and promptly.

N. The applicator shall submit written evidence of insurance coverage of an adequate amount to cover the cost of cleaning and/or repairing vehicles and other property which may be damaged by his work. The applicator shall use all precautions to avoid paint movement and shall notify the Contractor to have vehicles removed from susceptible areas.

O. A progress schedule shall be furnished by the applicator for approval and shall be based on the contract completion date. Applicator shall advise the Contractor of those areas in which work is to be performed 1 week in advance of the work schedule to permit the Contractor to prepare for the work, advise employees, move vehicles, etc.

1.9 QUALITY ASSURANCE

A. Paint Coordination: Provide finish coats which are compatible with prime paints used. Review other sections of these specifications in which prime and/or finish paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information on characteristics of finish material proposed for use, to ensure compatible prime coats are used. Provide barrier coats over incompatible primers or remove and prime as required. Notify the Contractor in writing of any anticipated problems using specified coating systems with substrates primed by others.

B. Examine specification sections of their trades for painting requirements, provisions therein affecting work of this Section.

C. Materials or work left unfinished by requirements of such other specifications but which are required to be painted shall be painted, finished to completion as part of work of this Section.

D. The applicator's qualifications, experience, etc., require the written approval and acceptance by the Paint Manufacturer.

E. Material Quality: Provide the manufacturer’s best quality paint material of the various coating types specified. Paint material containers not displaying manufacturer’s product identification will not be acceptable.

1.10 INSPECTION

A. Applicator must examine the areas and conditions under which painting work is to be applied and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Applicator.

B. Starting of painting work will be construed as the Applicator's acceptance of the surfaces and conditions within any particular area.

C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to the formation of a durable paint film.

D. Dry film thickness will be checked with a properly calibrated Nordson Mikrotest Dry Film Thickness Gauge or by other specifically approved instruments.

E. It will be the Applicator's responsibility to own and use a wet film thickness gauge to check his application thickness as he proceeds.

F. Small sample areas of each phase of work shall be done and checked by the Paint Manufacturer's representative. This will serve upon acceptance by the Architect and Owner as the job standard for remainder of that phase of work. This will also prevent misunderstanding as to interpretation of this specification's standards.

G. The Applicator shall advise the Paint Manufacturer's representative and Architect with enough lead-time prior to beginning each phase of work in order for inspection to not cause a delay in the work of the Applicator.

H. The Paint Manufacturer's representative shall be required to submit written reports to the Architect, Owner, Applicator and Contractor on the progress of satisfactory applications that will include initial job sample applications, and at least bi-weekly reports, that all work is being accomplished in accordance with his approval. These reports shall be a required attachment to each applicable Application for Payment. (Note that they apply to painting work only.) Refer to Section 00950 – Quality Assurance.

I. A final report to the Architect shall notify all parties that the completed work has been done in accordance with the manufacturer's recommendations, and the warranty period commences at the date of substantial completion. Acceptance must be in writing and presented no later than 10 days from receipt of final report, unless a written notice of specification deficiencies is necessary. Under such circumstances, the deficiencies shall then be corrected and new letters of completion and acceptance shall be exchanged.

1.11 SURFACE PREPARATION

A. Each surface shall be cleaned and prepared as specified in accordance with the Paint Manufacturer's surface preparation recommendations and requirements. The applicator is responsible for the finish of his work. Should any surface be found unsuitable to produce a proper paint or sealant finish, the Contractor shall be notified in writing and no material shall be applied until the unsuitable surfaces have been made satisfactory.

B. All exterior surfaces to be painted shall be cleaned to remove dirt, mildew, chalked paint and any foreign materials deterrent to the new finish and allowed to completely dry before painting.

C. Cracking that cannot be bridged by the paint film shall be brought to the attention of the Contractor who shall then direct repairs by the proper party.

D. Unprimed metals shall be mechanically hand tooled to bright metal and primed with a universal rust inhibitive primer as recommended by the Paint Manufacturer.

E. Painted wood surfaces shall be carefully inspected for evidence of deterioration or surface imperfections. Sandpaper any hard, glossy surface to ensure proper adhesion. Fill nail holes, imperfections and cracks with putty. Edges, corners, and raised grain shall be eased by sanding. Each coat required shall be sanded except the last. For surfaces scheduled to receive a prime coat only, sand, and re-prime after initial coat as required to conceal any defects due to insufficient sealing. Wood trim that is scheduled to be painted shall be spray painted; brush painting will not be acceptable.

F. Any loose and scaling shop painted item shall be cleaned by hand wire brushing or other suitable power tool cleaning as per SSPC-SP2 “Hand Tool Cleaning” or SSPC-SP3 “Power Tool Cleaning” standards then spot primed per the paint manufacturer's instructions.

G. Masonry and Stucco Repair, Patching and Caulking/Sealant Procedure:

1. Prior to any caulking or crack repair, all substrates must be cleaned to remove all mildew, dirt, loose or peeling paint, or any other foreign matter. Allow proper drying time of substrates before application of the products. Cracks shall be primed with a thinned solution of Pigmented Bonding Coat before any patching or caulking material is applied.

2. All construction joints and expansion joints shall be carefully inspected and cleaned prior to painting to assure desired adhesion to both surfaces.

3. Sound out all masonry/stucco cracks to determine bond to substrate. If hollow sound or disbonding is evident, immediately notify the Contractor in writing and proceed per Article 1.7 A. of this Section.

4. Concrete primer and concrete patching materials shall be approved by The Paint Manufacturer's representative and Architect before application.

5. Determine the alkalinity and moisture content of the surfaces to be painted by performing appropriate tests. If the surfaces are found to be sufficiently alkaline, to cause blistering and burning of the finish paint, correct this condition before application of paint. Do not paint over surfaces where the moisture content exceeds that permitted in the manufacturer's printed directions. Plaster shall be neutralized with manufacturer's Plaster Surface Conditioner; burned spots shall be touched up.

H. Galvanized Metal Surfaces: Galvanized metal surfaces shall be pretreated and wiped with a biodegradable cleaner to remove any dirt, oil or grease. The galvanized surfaces shall be prepared and primed prior to application of the finish coat(s) of paint as recommended by the paint manufacturer.

I. Hollow Metal Exterior Door Frames: The back of all exterior door frames shall be

primed with a bituminous mastic primer, from the bottom of the door to 18 inches above finish floor.

1.12 WARRANTY

A. Work performed to Specifications will be warranted as follows:

1. The Paint Manufacturer warrants to the building Owner and to the Contractor that for five (5) years after the date of substantial completion for the application of all coatings scheduled in Article 3.9 "Painting Schedule", Section 09911 – Exterior Painting of the project specifications and installed by the Painting Contractor, these coatings will be free from defects in manufacture and will conform to manufacturer's specifications for these products. In addition, if the Contractor applies each coating in accordance with the manufacturer's specification for application as noted below, the Paint Manufacturer warrants to the building Owner and to the Contractor that the product so applied will perform satisfactorily for three (3) years under installed conditions and will provide normal and customary protection of the substrate and will not crack, peel or blister for five (5) years under installed conditions. The warranty applies only to above-grade coated surfaces and does not apply to conditions caused by structural defect, building settlement or building movement as determined and certified by the project Structural Engineer, vandalism, negligence or other causes beyond the Paint Manufacturer's control.

2. The Paint Manufacturer representative will be given full and complete access to the job site during all stages of the construction. The paint manufacturer's representative will:

a. Inspect all surfaces prior to paint application.
b. Provide detailed written specifications for surface preparation, sealing, curing time, temperature, coatings specifications, or special application procedures for each scheduled coating.
c. Provide all reports, testing, monitoring, checking, etc. as listed in the project specification Section 09911 - Exterior Painting for this project.

4. Any claim made under this warranty must be in writing within thirty (30) days of the alleged product failure. "The paint manufacturer makes no other warranties, express or implied," including without extending or limiting the duration provided by law of any implied warranty or warranty of fitness for purpose or use." In the event that the installed product fails to conform to the above warranties, written notification will be forwarded to the Paint Manufacturer as noted above.

Within thirty (30) days, a response detailing the Paint Manufacturer's analysis and recommendations including the Contractor's schedule for required remedial actions will be provided for coordination with the Architect and Owner. Any recoated areas will be warranted only for the remainder of the original warranty period, which shall not be extended as a

result of the supply of replacement materials or labor.

Provide a signature element that includes the name and title of the signatories for the Paint Manufacturer, the building Owner, the Contractor, the date of substantial completion/warranty effective date, and the project name and address.

By issuing this warranty, the Paint Manufacturer and this contractor confirm that said warranty shall include and cover the Paint Manufacturer's costs relating to corrective or replacement paint, coatings or sealant work needed to re-establish the integrity of the paint for this project. This includes all labor and materials. This warranty shall apply to excessive cracking, chipping, peeling, or disbonding of the paint from any substrate. It is understood that minor fading is expected; however, any catastrophic discoloration or loss of color shall also be covered by said warranty.

1.13 MOCK-UPS

A. Prepare a field sample application of each scheduled paint color (mock-up) at locations approved by the Architect. Each mock-up shall cover approximately 4 square feet of area (2'-0" by 2'-0"). Apply mock-ups in quantities of paint colors selected and furnished by the Owner or Architect. Upon approval of preliminary colors by the Owner and the Architect, furnish final mock-ups.

B. At finished construction locations as directed and approved by the Architect, provide final painting field mock-ups to cover approximately 100 square feet of area (10'-0" by 10'-0") using final colors per Article 1.10 above. Mock-ups are to represent conditions of finished work including one typical horizontal to vertical interface for both interior and exterior conditions as well as typical wall surfaces.

C. Mock-ups approved by the Owner shall constitute standard of acceptance for remaining work. Do not disturb or alter mock-ups during remaining construction.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Basis of Design Product: Subject to compliance with requirements, provide Sherwin-Williams Company (The) or comparable product by one of the following:

1. PPG Paints.
2. Porter Paints
3. Devoe/ICI Paints

B. Manufacturers: Subject to compliance with the project requirements and specifications, provide products specified below or an Architect approved equal. The burden of proof of equality is on the proposer.

C. Substitutions: Where a selected manufacturer or product has been specified, and equal or superior product or change in manufacturer may be accepted only upon

review and written acceptance by the Architect. All such proposed changes or substitutions shall be submitted to the Architect with appropriate manufacturer's specifications and literature, environmental compliance assurance and independent laboratory testing data, and side by side comparative for each product type. The Architect's decision whether a product or manufacturer is equal or superior to the one specified shall be final. Refer to Division 01 for additional product substitution requirements.

A. All materials used in this paint contract shall be as manufactured and delivered on the job in original, sealed containers.

B. The paints herein specified are known to be suitable and will be enforced as the required standards of quality of this work.

C. Extra Materials: Provide 10-gallons of each selected color for maintenance stock to the Owner.

D. Provide a final typed painting schedule to be included in Section 01700 – Project Closeout with maintenance manuals.

E. All coatings shall contain the mildewcide M-1 additive, or paint manufacturer's approved equal, as manufactured by Jomaps, Inc. The quantity of the additive shall be per the manufacturer's requirements in order to provide mildew resistance.

F. Damp proofing to be applied to the interior face of the perimeter exterior CMU walls shall be "Dry-Lock", or approved equal.

2.2 COLORS

A. Colors of the exterior building envelope shall be as selected by the Owner, and the Architect, Color schedules shall be furnished to the Applicator before application of prime coats. Prime coats will be tinted to be a slightly different shade compared to the succeeding coat.

B. Colors of the storage and mechanical rooms will be a single color; antique white or similar to be approved by the Owner and Architect.

PART 3 -EXECUTION

3.1 INSPECTION

A. Prior to installation of the work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence. Painting contractor shall notify the General Contractor in writing if repair or replacement of any damaged or otherwise unacceptable substrates exist or is necessary. Verify that painting may be completed in strict accordance with the project requirements/specifications and with the manufacturer's recommendations. Do not proceed until all such discrepancies have been fully resolved.

B. All work will be inspected and approved in writing, on a regular basis by the paint manufacturer's representative. A schedule of inspections required of the manufacturer will be reviewed and coordinated with the General Contractor prior to the commencement of the painting work.

1. The minimum inspection requirements prior to start of each area or drop are:

a. Verify that surfaces are ready to receive work.

b. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

c. Verify that substrate moisture content and PH do not exceed recommended conditions as predetermined by all parties involved.

d. Examine all caulk joints for use of appropriate sealant, adequate application and adequate adhesion.

2. Minimum testing during application:

a. Moisture.

b. PH test.

c. Wet mil test of base application.

d. Dry mil test of base application.

e. Wet mil test of finish coat(s).

3. Minimum upon completion:

a. Dry mil test of completed application.

b. Summary report of all testing and copies of all field testing reports.

3.2 SURFACE PREPARATION

A. General: Clean and prepare surfaces to be painted in accordance with manufacturer's printed instructions and current recommendations for each particular substrate condition and as specified.

1. Notify the Architect and General Contractor in writing of problems anticipated using specified finish coat material with substrates primed by others.

2. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and items in place that are not to be painted, or provide suitable protection prior to surface preparation and painting. Remove items if necessary for complete painting of the items and adjacent surfaces. Following completion of painting operations in each space or area, reinstall items removed using workmen skilled in the trades involved.

3. Clean surfaces before applying paint or surface treatment. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

B. Cementitious Surfaces: Prepare concrete, concrete masonry, and similar surfaces to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. Use abrasive blast cleaning if recommended by paint manufacturer.

1. Determine alkalinity and moisture content of surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

C. Wood: Clean surfaces of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper as required. Sand surfaces exposed to view smooth, and dust off.

1. Scrape and clean, small, dry, seasoned knots and apply a thick coat of white shellac or other recommended knot sealer, before application of primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.

2. Prime, stain, or seal wood to be painted immediately upon delivery. Prime edges, ends, faces, undersides, and backsides of wood.

3. When transparent finish is required, use spar varnish for back priming.

4. Seal tops, bottoms, ends and cutouts of unprimed wood doors and pre-engineered wood beams with heavy coat of varnish or sealer immediately upon delivery.

D. Ferrous Metals: Clean non-galvanized ferrous metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council (SSPC).

1. Touch-up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.

E. Galvanized Surfaces: Clean galvanized surfaces with non-petroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pre-treatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

G. Doors: Door bottoms and tops shall be primed and painted prior hanging the doors. The Contractor shall coordinate the timing of the work to ensure that this process is completed prior to hanging the doors within the frame.

3.3 GENERAL

A. Protect work of other trades, whether to be painted or not, from damage by painting work. Mask hardware as required to protect, i.e. brass door butts, etc.

B. Provide “Wet Paint” signs where appropriate to protect uncured finishes.

C. Spray applications, when used, shall produce the equivalent hiding quality per coat as brush or roller-applied coats. Do not double back with spray equipment for the purpose of building up film thickness of two coats in one pass. All spray applied paint shall be “back rolled” to assure proper coverage and uniformity.

D. The first and second coats of paint will be of slightly different shades for inspection purposes.

E. Viscosity and thickness tests may be taken by the General Contractor or manufacturer. Cost of tests will be borne by the subcontractor if found to be below specification requirements.

F. Painter to protect floors from over-spray and to clean if necessary.

G. All weather stripping around doors, windows and other openings shall not be painted. Special care shall be taken to properly “mask” and protect these components from all painting operations.

H. Subcontractor shall provide adequate painting protection for all of the trades work throughout the painting operations. Once surrounding services have been painted and protection is no longer needed, temporary protection shall be removed.

J. Clean all surfaces of foreign matter prior to any paint application.

3.4 MATERIALS PREPARATION

A. Mix and prepare paint in accordance with manufacturer’s directions. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.

B. Use factory mixed colors, shade, and tints. Job mixing permitted only with specific written approval of the Paint Manufacturer's representative and the Architect.

C. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing, and application of paint in a clean condition, free of foreign materials and residue.

D. Stir materials before application to produce a mixture of uniform density, and stir as required during the application of the materials. Do not stir surface film into the material. Remove the film and if necessary, strain the material before using.

E. Use only thinners approved by manufacturer, and only within recommended limits.

3.5 APPLICATION

A. Apply paint of consistency recommended by and in accordance with the paint manufacturer's data sheets. Use tools and techniques best suited for the substrate and type of material being applied per manufacturer's data sheets.

B. Paint interior surfaces of ducts where visible through registers or grilles, with a flat, non-specular black paint as per paint schedule.

C. Finish exterior and interior doors on tops, bottoms and side edges the same as the exterior faces, unless otherwise indicated.

D. Exposed pipes and ductwork on or near walls or ceilings that are to be painted shall be painted, unless otherwise indicated.

E. Orange peel/rough finish on metal or wood surfaces shall not be permitted.

F. Provide primer coats for all walls and trim to receive a faux finish. Faux finishes are not included in this contract.

G. The number of coats and film thickness required is the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce a smooth, even surface, in accordance with the manufacturer’s directions.

H. Apply additional coats when undercoats show through final coat of paint, until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry-film-thickness equivalent to that of flat surfaces.

I. The term “exposed surfaces” includes areas visible when permanent or built-in fixtures, convector covers, grilles and similar components are in place. Extend coatings in these areas to maintain system integrity and provide desired protection.

J. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.

K. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.

L. Finish exterior doors on tops, bottoms, and side edges same as exterior faces. The back of hollow metal-exterior door frames shall be finished with a mastic primer, from the bottom of the door to 18 inches above the finish floor.

M. Omit primer on metal surfaces that have been shop-primed and touch up painted.

N. Sand lightly between each succeeding enamel or varnish coat.

O. Scheduling Painting: Apply first-coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable, and before subsequent surface deterioration. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure and where application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

P. Minimum Coating Thickness: Apply materials at the manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by the manufacturer.

Q. Block Fillers: Apply block fillers to concrete masonry unit at a rate to ensure complete coverage with pores filled.

R. Prime Coats: Before application of finish coats, apply a prime coat of material as recommended by the manufacturer to material required to be painted or finished, and has not been prime coated by others.

1. Recoat primed and sealed substrates where evidence of suction spots or unsealed areas in the first coat appears, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

S. Brush Application: Brush-out and work brush coats into surfaces in an even film. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Draw neat glass lines and color breaks.

1. Apply primers and first coats by brush unless manufacturer's instructions permit use of mechanical applicators.

T. Mechanical Applications: Use mechanical methods for paint application when permitted by manufacturer's recommendation, governing ordinances, and trade union regulations.

1. Wherever spray application is used, apply coat to provide the equivalent hiding of brush-applied coats. Do not double-back with spray equipment building-up film thickness of two coats in one pass unless recommended by the manufacturer.

U. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirement.

3.6 FIELD QUALITY CONTROL

A. The Owner reserves the right to engage the services of an independent testing laboratory to sample and test paint material being used. Samples of material delivered to the project will be taken, identified, sealed, and certified in the presence of the Contractor.

1. The testing laboratory will perform appropriate tests as required by the Owner.

2. If tests show material being used does not comply with specified requirements, the Contractor may be directed to stop painting pay for testing, repaint surfaces coated with reject paint, remove rejected paint from previously painted surfaces if, upon repainting with the specified paint, the two coatings are non-compatible.

3.7 CLEAN UP AND PROTECTION

A. During the progress of the work, remove from the site all discarded paint materials, rubbish, cans, and rags at the end of each workday.

B. Remove splashed, dropped, spattered, and spilled paint from hardware, fixtures, glass, and building parts.

C. Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing, or replacing, and repainting as acceptable to the Architect.

D. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.

E. At the completion of work of other trades, and after notification in writing to the Contractor, touch-up and restore all damaged or defaced painted surfaces. A touch-up allowance will be included in final contract.

3.9 PAINT SCHEDULE

3.9.1 COLOR SCHEDULE EXTERIOR PAINTING

Exterior Building Colors to be selected by the Architect
Color “A” To Be Determined
Color “B” To Be Determined
Color “C” To Be Determined
Color “D” To Be Determined
Color “E” To Be Determined
Color “F” To Be Determined
Color “G” To Be Determined
Color “H” To Be Determined

Color “I” To Be Determined
Color “HA” To Be Determined
Color “HB” To Be Determined
Color “HC” To Be Determined

3.9.2 PAINT SYSTEMS AND COATING SCHEDULE

Refer to the Exterior Elevations for the color scheme and various painted material types (letter designation) scheduled below. Provide finish scheduled below if not indicated on the drawings and/or finish schedule.

A. THE SHERWIN WILLIAMS COMPANY: Attached are the Material Supplier's detailed prime and finish coats specifications. This defines primer and finish coat names, product number designations, and thickness. Because this supplier is providing a warranty, strict adherence to product Data Sheet and label instructions shall be followed. The following schedule shall not be considered as entirely inclusive, but construed as a general guide for complete painting of buildings, structures, etc., including, but not limited to, storage spaces, recesses, returns, reveals, soffits, haunches, forming part of a particular surface, room or space, pipes, conduits, duct work, panels, mechanical equipment, etc.

FINISH TYPE		Wet Film Thickness MILS	Dry Film Thickness MILS	Spread Rate SF/Gal.
A1. Concrete Floor Stain				
1st coat	H&C Concrete Sealer Solid Color Solvent Based Thinned 25%			175
2nd coat	H&C Concrete Sealer Solid Color Solvent Based Full Strength			200
A2. Parking Stripes				
1st coat	Sherwin Williams Pro/Mar Traffic Marking Paint B29 Series 4” Stripe	14.0	7.0	350
2nd coat	Sherwin Williams Pro/Mar Traffic Marking Paint B29 Series	14.0	7.0	350
	TOTAL DRY MILS		14.0	
A3. Exterior Concrete				
1st coat	Sherwin Williams Loxon Concrete & Masonry Primer/Sealer A24W300	8.0	3.2	200
2nd coat	Sherwin Williams Loxon Acrylic Coating A24W300	8.0	3.8	200
	TOTAL DRY MILS		7.0	

C1. Exterior Plaster (Stucco) and Ceilings

1st coat	Sherwin Williams Loxon Concrete & Masonry Primer/Sealer A24W300	8.0	3.2	200
2nd coat	Sherwin Williams Loxon Acrylic Coating A24W300	8.0	3.8	200

TOTAL DRY MILS 7.0

D1. Exterior Gypsum Board Ceilings

1st coat	Sherwin Williams Loxon Concrete & Masonry Primer/Sealer A24W300	8.0	3.2	200
2nd coat	Sherwin Williams A-100 Exterior Gloss Latex, A8 Series	4.0	1.3	300

TOTAL DRY MILS 4.5

E1. Structural Steel

1st coat	Sherwin Williams Kern Komick Universal Metal Primer B50 Series	6.0	3.0	200
2nd coat	Sherwin Williams A-100 Exterior Gloss Latex, A8 Series	4.0	3.0	200

TOTAL DRY MILS 4.3

E2. Structural Steel Touch-Up

1st coat	Sherwin Williams Kern Komick Universal Metal Primer B50	6.0	3.0	200

E3. Unfinished Ferrous Metals

1st coat	Sherwin Williams Kern Komick Universal Metal Primer B502	6.0	3.0	200-250
2nd coat	Sherwin Williams Pro Industrial High Performance Acrylic, B66-650 Series	6.0	2.5	200

TOTAL DRY MILS 5.5

E4. Exterior Galvanized Metal
(If Galvanized Metal is Surface Treated, must Solvent Clean with Biodegradable Cleaner)

1st coat	Sherwin Williams Pro Industrial Pro-Cryl Universal Primer, B66-310 Series	7.5	3.0	264
2nd coat	Sherwin Williams Pro Industrial High Performance Acrylic, B66-650 Series	6.0	2.5	200

TOTAL DRY MILS 5.5

E5. <u>Galvanized</u>

1st coat	Sherwin Williams Pro Industrial Pro-Cryl Universal Primer, B66-310 Series	7.5	3.0	264
2nd coat	Sherwin Williams A-100 Gloss A-8 Series	4.0	1.3	3
3 rd coat	Sherwin Williams A-100 Gloss A-8 Series	4.0	1.3	300

TOTAL DRY MILS 5.6

E6. Galvanized Surface touch-up

1st coat	Sherwin Williams Pro Industrial Pro-Cryl Universal Primer, B66-310 Series	7.5	3.0	264

E7. Unprimed Ferrous Metal and Overhead Grille Brackets

Pretreatment: Clean in accordance with Paragraph 1.11D.

1st coat	Sherwin Williams Kern Komick Universal Metal Primer B50	6.0	3.0	200
2nd coat	Sherwin Williams Pro Industrial High Performance Acrylic, B66-600	6.0	2.5	200

TOTAL DRY MILS 5.5

H1. Wood Stain/Sealer-Semi Transparent

Pretreatment: Prepare surface in accordance with mfg. requirements.

1st coat	Sherwin Williams WoodScapes® Semi-Transparent Stain-Color TBD, A15 Series			200
2nd coat	Sherwin Williams WoodScapes Semi-Transparent Stain-Clear, A15 Series			200

S1. Exterior Sealant

Stampede-Acrylic Urethane Sealant

END OF SHERWIN WILLIAMS COMPANY PAINT SYSTEMS SCHEDULE

END OF SECTION 09911

SECTION 09912 – INTERIOR PAINTING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surface preparations, painting, and finishing of exposed interior items and surfaces.

1. Surface preparation, priming and finish coats specified in this Section are in addition to shop priming and surface treatment specified under other Sections.

B. Paint exposed surfaces whether or not colors are designated in “schedule” except where a surface or material is indicated not to be painted or is to remain natural. Where an item or surface is not mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect and Owner will select from standard colors or finishes available.

1. Painting includes field painting exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.

C. Painting is not required on pre-finished items, finished metal surfaces, concealed surfaces, operating parts, or labels.

1. Labels: Do not paint over Underwriter’s Laboratories, Factor Mutual or other code-required labels, or equipment name, identification, performance rating, or nomenclature plates.

D. The Contractor shall apply damp proofing to the interior face of the perimeter New exterior CMU walls to (where concealed) reduce moisture intrusion during the course of construction, until the final exterior paint system is applied.

E. Non-Galvanized Structural Steel to receive fireproofing as scheduled, shown, or required by the FBC shall be primed by the fabricator but not finished painted.

F. Coating Maintenance Manual: upon conclusion of the project, the Contractor or paint manufacture/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams “Custodian Project Color and Product Information” report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages,

Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.3 GENERAL

A. Furnish all labor, materials, tools, equipment, etc. and services necessary and incidental to the complete fabrication, furnishing and erection of this Section as shown, noted, detailed and reasonably implied on the drawings and in the specifications.

B. Note that warranty requirements are an integral part of the work in this Section and all criteria listed per Article 1.9 of this Section apply.

C. Note that the requirement for prime and finish painting may be included in various Mechanical, Electrical, Plumbing, Fire Protection, and Structural sections of this specification. Coordination is required.

D. The Paint Manufacturer shall also provide their own company paint and coatings specifications accompanied by Product Data and Material Safety Data sheets as part of Article 1.6 Submittals below. It is the intent of these Specifications to establish quality and workmanship detail, and define both generic systems and the extent of the caulking and coatings applications in a general way. It shall then be the responsibility of the Paint Manufacturer to attach and comply with their own company paint and coatings specifications for the precise primers and finish coats and application procedure and methods to ensure this criteria is followed.

E. In the event of discrepancy, the Paint Manufacturer’s specifications shall take precedence over these specifications. Notify the Architect in writing for each and every specific situation as it occurs prior to application of any material.

F. The Paint Manufacturer shall exercise rights of approval in the selection of a competent applicator, which meets their standards for quality workmanship and levels of experience.

G. Although the Paint Manufacturer may not actually manufacture caulking compounds equivalent to these specified herein, they shall be responsible for this phase of work as described in Article1.9 of this Section.

1.4 RELATED SECTIONS

A. Coordinate work of this Section with work of other Sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other Sections, including:

1. Division 5 Section “Metal Fabrications” for shop priming ferrous metal.
2. Division 7 Section “Sprayed Fire-Resistive Materials” and “Caulking and Sealants.”
3. Division 8 Section “Steel Doors and Frames” for shop priming steel doors and frames.

4. Division 9 Section “Exterior Painting” for surface preparation and the application of paint systems on exterior substrates.

1.5 DEFINITIONS

A. “Paint” includes coating system materials, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

1.6 SUBMITTALS

A. Data: Submit product data under provisions of Section 01300 – Shop Drawings, Product Data and Samples to include the Paint Manufacturer's application instructions for all products intended for work in this Section.

B. Painting Schedule: Shall include, but not limited to the following:

1. Pretreatment requirements for each paint system.

2. Spread Rate - gallons per square foot.

3. Wet film thickness in mils.

4. Dry film thickness in mils.

5. Total dry film thickness in mils.

6. Format identical to Article 3.8 PAINT SCHEDULE

C. Samples:

1. Submit manufacturer's standard color chips. Architect and Owner will select colors from manufacturer's color chip brochures. Contractor to prepare color chip samples specified herein before using selected colors. Architect and Owner will make final selection from such color chips and prepare color schedule for Contractor's use.

2. Do not proceed with any painting work until field sample panels of each paint system specified are applied and reviewed by the Architect and Owner.

D. Applicator Certification: Written acceptance of the applying company per Article 1.9 D. of this section.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Section 01600 – Materials and Equipment and Section 01620 – Storage and Protection.

B. Deliver all materials to the job site in original, new and unopened packages and

containers bearing the manufacturer's name and label, and the following information:

1. Product name or title of material,

2. Product description (generic classification or binder type).

3. Manufacturer's name, stock number and date of manufacture.

4. Contents by volume, for major pigment and vehicle constituents,

5. Thinning instructions,

6. Application instructions,

7. Color name and number,

8. No materials other than types specified or approved may be delivered to project site. Unapproved materials shall be removed from project site immediately.

C. Storage and Use of Premises:

1. The applicator shall confine his apparatus, materials storage and operations of his workers to limits indicated by Contractor. All materials used on the job shall be stored in a single place designated by the Contractor. Such storage shall be kept clean and the applicator shall be liable for damage to surrounding areas.

2. Inflammable material and/or fire hazard waste shall be stored, handled and used in an approved manner and shall be removed from the site daily.

D. Store materials not in use in tightly covered containers in a well ventilated area at a minimum ambient temperature of 45 degrees F., or as required by the manufacturer. Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

2. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.8 JOB CONDITIONS

A. Paint only in dry weather when temperature is 50 degrees F or higher. Stop exterior work early to permit paint film to set up before condensation, caused by night temperature drops, occur. Do not begin painting until surfaces are moisture free.

B. Do not varnish or enamel in direct sunlight.

C. Keep paint at room temperature.

D. Sweep dust, dirt and debris away before painting.

E. Execute work in accordance with label directions. Coating applications shall be made in strict conformance to this specification and to the manufacturer's paint instructions on the labels and product data sheets.

F. Paint only dry wood (less than 15 percent moisture). Defer painting until moisture content meets manufacturer's recommendations.

G. Environmental Requirements:

1. Measure moisture content of surfaces using an electronic moisture meter. Do not apply coating unless moisture content of surfaces is below the manufacturer’s recommendations.

2. Paint PH tests shall be taken prior to painting subcontractor beginning his work. PH level to be acceptable to paint manufacturer and subcontractor prior to paint application. Costs of tests to be paid by painting contractor. Provide written documentation of all test results immediately to on-site General Contractor’s superintendent.

3. Strictly follow manufacturer’s recommendations pertaining to environmental conditions.

H. All work shall be accomplished by skilled workmen familiar with and trained to do this type of work and they shall be further qualified to operate or use the equipment and rigging needed to accomplish this work.

I. Materials shall be applied evenly and free of runs, sags, or pinholes.

J. Type and amount prescribed for thinners, solvents, cleaners, etc. to be confirmed by and based on the Paint Manufacturer's written recommendation and approval.

K. All application tools and equipment shall be in good working order and suitable for proper application. All surrounding areas shall be fully protected against damage during each stage of the painting project. All exterior and interior substrates designated not to receive paint coatings shall be kept free of paint residue, e.g. windows, etc.

L. Normal safety signs, necessary lighting and temporary fencing around work areas shall be installed and maintained in accordance with OSHA requirements while work is in progress.

M. Where spray painting has been approved by the Architect, this applicator shall protect all adjacent materials and surfaces by covering entire said areas with approved protective materials. Overspray will not be accepted and, if it occurs,

shall be cleaned up properly and promptly.

N. The applicator shall submit written evidence of insurance coverage of an adequate amount to cover the cost of cleaning and/or repairing vehicles and other property which may be damaged by his work. The applicator shall use all precautions to avoid paint movement and shall notify the Contractor to have vehicles removed from susceptible areas.

O. A progress schedule shall be furnished by the applicator for approval and shall be based on the contract completion date. Applicator shall advise the Contractor of those areas in which work is to be performed 1 week in advance of the work schedule to permit the Contractor to prepare for the work, advise employees, move vehicles, etc.

1.9 QUALITY ASSURANCE

A. Paint Coordination: Provide finish coats which are compatible with prime paints used. Review other sections of these specifications in which prime and/or finish paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information on characteristics of finish material proposed for use, to ensure compatible prime coats are used. Provide barrier coats over incompatible primers or remove and prime as required. Notify the Contractor in writing of any anticipated problems using specified coating systems with substrates primed by others.

B. Examine specification sections of their trades for painting requirements, provisions therein affecting work of this Section.

C. Materials or work left unfinished by requirements of such other specifications but which are required to be painted shall be painted, finished to completion as part of work of this Section.

D. The applicator's qualifications, experience, etc., require the written approval and acceptance by the Paint Manufacturer.

E. Material Quality: Provide the manufacturer’s best quality paint material of the various coating types specified. Paint material containers not displaying manufacturer’s product identification will not be acceptable.

1.10 INSPECTION

A. Applicator must examine the areas and conditions under which painting work is to be applied and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Applicator.

B. Starting of painting work will be construed as the Applicator's acceptance of the surfaces and conditions within any particular area.

C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to the formation of a durable paint film.

D. Dry film thickness will be checked with a properly calibrated Nordson Mikrotest Dry Film Thickness Gauge or by other specifically approved instruments.

E. It will be the Applicator's responsibility to own and use a wet film thickness gauge to check his application thickness as he proceeds.

F. Small sample areas of each phase of work shall be done and checked by the Paint Manufacturer's representative. This will serve upon acceptance by the Architect and Owner as the job standard for remainder of that phase of work. This will also prevent misunderstanding as to interpretation of this specification's standards.

G. The Applicator shall advise the Paint Manufacturer's representative and Architect with enough lead-time prior to beginning each phase of work in order for inspection to not cause a delay in the work of the Applicator.

H. The Paint Manufacturer's representative shall be required to submit written reports to the Architect, Owner, Applicator and Contractor on the progress of satisfactory applications that will include initial job sample applications, and at least bi-weekly reports, that all work is being accomplished in accordance with his approval. These reports shall be a required attachment to each applicable Application for Payment. (Note that they apply to painting work only.) Refer to Section 00950 – Quality Assurance.

I. A final report to the Architect shall notify all parties that the completed work has been done in accordance with the manufacturer's recommendations, and the warranty period commences at the date of substantial completion. Acceptance must be in writing and presented no later than 10 days from receipt of final report, unless a written notice of specification deficiencies is necessary. Under such circumstances, the deficiencies shall then be corrected and new letters of completion and acceptance shall be exchanged.

1.11 SURFACE PREPARATION

A. Each surface shall be cleaned and prepared as specified in accordance with the Paint Manufacturer's surface preparation recommendations and requirements. The applicator is responsible for the finish of his work. Should any surface be found unsuitable to produce a proper paint or sealant finish, the Contractor shall be notified in writing and no material shall be applied until the unsuitable surfaces have been made satisfactory.

B. All interior surfaces to be painted shall be cleaned to remove dirt, mildew, chalked paint and any foreign materials deterrent to the new finish and allowed to completely dry before painting.

C. Cracking that cannot be bridged by the paint film shall be brought to the attention of the Contractor who shall then direct repairs by the proper party.

D. Unprimed metals shall be mechanically hand tooled to bright metal and primed with a universal rust inhibitive primer as recommended by the Paint Manufacturer.

E. Painted wood surfaces shall be carefully inspected for evidence of deterioration or surface imperfections. Sandpaper any hard, glossy surface to ensure proper adhesion. Fill nail holes, imperfections and cracks with putty. Edges, corners, and raised grain shall be eased by sanding. Each coat required shall be sanded except the last. For surfaces scheduled to receive a prime coat only, sand, and re-prime after initial coat as required to conceal any defects due to insufficient sealing. Wood trim that is scheduled to be painted shall be spray painted; brush painting will not be acceptable. Wood floors shall receive (4) four coats of sealer.

F. Any loose and scaling shop painted item shall be cleaned by hand wire brushing or other suitable power tool cleaning as per SSPC-SP2 “Hand Tool Cleaning” or SSPC-SP3 “Power Tool Cleaning” standards then spot primed per the paint manufacturer's instructions.

G. Galvanized Metal Surfaces: Galvanized metal surfaces shall be pretreated and wiped with a biodegradable cleaner to remove any dirt, oil or grease. The galvanized surfaces shall be prepared and primed prior to application of the finish coat(s) of paint as recommended by the paint manufacturer.

1.12 WARRANTY

A. Work performed to Specifications will be warranted as follows:

1. The Paint Manufacturer warrants to the building Owner and to the Contractor that for five (5) years after the date of substantial completion for the application of all coatings scheduled in Article 3.8 "Painting Schedule", Section 09912 – Interior Painting of the project specifications and installed by the Painting Contractor, these coatings will be free from defects in manufacture and will conform to manufacturer's specifications for these products. In addition, if the Contractor applies each coating in accordance with the manufacturer's specification for application as noted below, the Paint Manufacturer warrants to the building Owner and to the Contractor that the product so applied will perform satisfactorily for three (3) years under installed conditions and will provide normal and customary protection of the substrate and will not crack, peel or blister for five (5) years under installed conditions. The warranty applies only to above-grade coated surfaces and does not apply to conditions caused by structural defect, building settlement or building movement as determined and certified by the project Structural Engineer, vandalism, negligence or other causes beyond the Paint Manufacturer's control.

2. The Paint Manufacturer representative will be given full and complete access to the job site during all stages of the construction. The paint manufacturer's representative will:

a. Inspect all surfaces prior to paint application.

b. Provide detailed written specifications for surface preparation, sealing, curing time, temperature, coatings specifications, or special application procedures for each scheduled coating.
c. Provide all reports, testing, monitoring, checking, etc. as listed in the project specification Section 09912 – Interior Painting for this project.

4. Any claim made under this warranty must be in writing within thirty (30) days of the alleged product failure. "The paint manufacturer makes no other warranties, express or implied," including without extending or limiting the duration provided by law of any implied warranty or warranty of fitness for purpose or use." In the event that the installed product fails to conform to the above warranties, written notification will be forwarded to the Paint Manufacturer as noted above.

Within thirty (30) days, a response detailing the Paint Manufacturer's analysis and recommendations including the Contractor's schedule for required remedial actions will be provided for coordination with the Architect and Owner. Any recoated areas will be warranted only for the remainder of the original warranty period, which shall not be extended as a result of the supply of replacement materials or labor.

Provide a signature element that includes the name and title of the signatories for the Paint Manufacturer, the building Owner, the Contractor, the date of substantial completion/warranty effective date, and the project name and address.

By issuing this warranty, the Paint Manufacturer and this contractor confirm that said warranty shall include and cover the Paint Manufacturer's costs relating to corrective or replacement paint, coatings or sealant work needed to re-establish the integrity of the paint for this project. This includes all labor and materials. This warranty shall apply to excessive cracking, chipping, peeling, or disbonding of the paint from any substrate. It is understood that minor fading is expected; however, any catastrophic discoloration or loss of color shall also be covered by said warranty.

1.13 MOCK-UPS

A. Prepare a field sample application of each scheduled paint color (mock-up) at locations approved by the Architect. Each mock-up shall cover approximately 4 square feet of area (2'-0" by 2'-0"). Apply mock-ups in quantities of paint colors selected and furnished by the Owner or Architect. Upon approval of preliminary colors by the Owner and the Architect, furnish final mock-ups.

B. At finished construction locations as directed and approved by the Architect, provide final painting field mock-ups to cover approximately 100 square feet of area (10'-0" by 10'-0") using final colors per Article 1.10 above. Mock-ups are to represent conditions of finished work including one typical horizontal to vertical interface for both interior and exterior conditions as well as typical wall surfaces.

C. Mock-ups approved by the Owner shall constitute standard of acceptance for remaining work. Do not disturb or alter mock-ups during remaining construction.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Basis of Design Product: Subject to compliance with requirements, provide Sherwin-Williams Company (The) or comparable product by one of the following:

1. PPG Paints.
2. Porter Paints
3. Devoe/ICI Paints

B. Manufacturers: Subject to compliance with the project requirements and specifications, provide products specified below or an Architect approved equal. The burden of proof of equality is on the proposer.

C. Substitutions: Where a selected manufacturer or product has been specified, and equal or superior product or change in manufacturer may be accepted only upon review and written acceptance by the Architect. All such proposed changes or substitutions shall be submitted to the Architect with appropriate manufacturer's specifications and literature, environmental compliance assurance and independent laboratory testing data, and side by side comparative for each product type. The Architect's decision whether a product or manufacturer is equal or superior to the one specified shall be final. Refer to Division 01 for additional product substitution requirements.

D. All materials used in this paint contract shall be as manufactured and delivered on the job in original, sealed containers.

E. The paints herein specified are known to be suitable and will be enforced as the required standards of quality of this work.

F. Extra Materials: Provide 10-gallons of each selected color for maintenance stock to the owner.

G. Provide a final typed painting schedule to be included in Section 01700 – Project Closeout with maintenance manuals.

H. Damp proofing to be applied to the interior face of the perimeter New exterior CMU walls (where concealed) walls are to be "Dry-Lock", or approved equal.

2.2 COLORS

A. Colors of the interior of the project shall be as selected by the Owner and the Architect. Color schedules shall be furnished to the Applicator before application of prime coats. Prime coats will be tinted to be a slightly different shade compared to

the succeeding coat. Refer to the Drawings for the paint colors and location.

B. Colors of the storage and mechanical rooms will be a single color; antique white or similar color based on the Airport standard to be approved by the Owner and Architect.

PART 3 EXECUTION

3.1 INSPECTION

A. Prior to installation of the work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence. Painting contractor shall notify the General Contractor in writing if repair or replacement of any damaged or otherwise unacceptable substrates exist or is necessary. Verify that painting may be completed in strict accordance with the project requirements/specifications and with the manufacturer's recommendations. Do not proceed until all such discrepancies have been fully resolved.

B. All work will be inspected and approved in writing, on a regular basis by the paint manufacturer's representative. A schedule of inspections required of the manufacturer will be reviewed and coordinated with the General Contractor prior to the commencement of the painting work.

1. The minimum inspection requirements prior to start of each area or drop are:

   a. Verify that surfaces are ready to receive work.

   b. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

   c. Verify that substrate moisture content and PH do not exceed recommended conditions as predetermined by all parties involved.

   d. Examine all caulk joints for use of appropriate sealant, adequate application and adequate adhesion.

2. Minimum testing during application:

   a. Moisture.

   b. PH test.

   c. Wet mil test of base application.

   d. Dry mil test of base application.

e. Wet mil test of finish coat(s).

3. Minimum upon completion:

a. Dry mil test of completed application.

b. Summary report of all testing and copies of all field testing reports.

3.2 SURFACE PREPARATION

A. General: Clean and prepare surfaces to be painted in accordance with manufacturer's printed instructions and current recommendations for each particular substrate condition and as specified.

1. Notify the Architect and General Contractor in writing of problems anticipated using specified finish coat material with substrates primed by others.

2. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and items in place that are not to be painted, or provide suitable protection prior to surface preparation and painting. Remove items if necessary for complete painting of the items and adjacent surfaces. Following completion of painting operations in each space or area, reinstall items removed using workmen skilled in the trades involved.

3. Clean surfaces before applying paint or surface treatment. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

B. Cementitious Surfaces: Prepare concrete, concrete masonry, and similar surfaces to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. Use abrasive blast cleaning if recommended by paint manufacturer.

1. Determine alkalinity and moisture content of surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

C. Wood: Clean surfaces of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper as required. Sand surfaces exposed to view smooth, and dust off.

1. Scrape and clean, small, dry, seasoned knots and apply a thick coat of white shellac or other recommended knot sealer, before application of primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.

2. Prime, stain, or seal wood to be painted immediately upon delivery. Prime edges, end, faces, undersides, and backsides of wood.

3. When transparent finish is required, use spar varnish for back priming.

4. Seal tops, bottoms, and cutouts of unprimed wood doors with heavy coat of varnish or sealer immediately upon delivery.

5. Wood floors to receive (4) four coats of sealer; refer to specification Section - Wood Flooring for field finishing requirements. Initial coats shall be thinned for maximum penetration of sealer.

D. Ferrous Metals: Clean non-galvanized ferrous metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council (SSPC).

1. Touch-up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.

E. Galvanized Surfaces: Clean galvanized surfaces with non-petroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pre-treatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

E. Doors: Door bottoms and tops shall be primed and painted prior to hanging the doors. The Contractor shall coordinate the timing of this work to ensure that this process is completed prior to hanging the doors within the frame.

3.3 GENERAL

A. Protect work of other trades, whether to be painted or not, from damage by painting work. Mask hardware as required to protect, i.e. brass door butts, etc.

B. Provide “Wet Paint” signs where appropriate to protect uncured finishes.

C. Spray applications, when used, shall produce the equivalent hiding quality per coat as brush or roller-applied coats. Do not double back with spray equipment for the purpose of building up film thickness of two coats in one pass. All spray applied paint shall be “back rolled” to assure proper coverage and uniformity.

D. The first and second coats of paint will be of slightly different shades for inspection purposes.

E. Viscosity and thickness tests may be taken by the General Contractor or manufacturer. Cost of tests will be borne by the subcontractor if found to be below specification requirements.

F. Painter to protect floors from over-spray and to clean if necessary.

G. All weather stripping around doors, windows and other openings shall not be painted. Special care shall be taken to properly “mask” and protect these components from all painting operations.

H. All finished drywall surfaces shall be coated with a primer/sealer to highlight any imperfection in the drywall surface, which shall be repaired before the final application of paint is applied.

I. Subcontractor shall provide adequate painting protection for all of the trades work throughout the painting operations. Once surrounding services have been painted and protection is no longer needed, temporary protection shall be removed.

J. Clean all surfaces of foreign matter prior to any paint application.

3.4 MATERIALS PREPARATION

A. Mix and prepare paint in accordance with manufacturer’s directions. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.

B. Use factory mixed colors, shade, and tints. Job mixing permitted only with specific written approval of the Paint Manufacturer's representative and the Architect.

C. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing, and application of paint in a clean condition, free of foreign materials and residue.

D. Stir materials before application to produce a mixture of uniform density, and stir as required during the application of the materials. Do not stir surface film into the material. Remove the film and if necessary, strain the material before using.

E. Use only thinners approved by manufacturer, and only within recommended limits.

3.5 APPLICATION

A. Apply paint of consistency recommended by and in accordance with the paint manufacturer's data sheets. Use tools and techniques best suited for the substrate and type of material being applied per manufacturer's data sheets.

B. Paint interior surfaces of ducts where visible through registers or grilles, with a flat, non-specular black paint as per paint schedule.

C. Finish exterior and interior doors on tops, bottoms and side edges the same as the exterior faces, unless otherwise indicated.

D. Exposed pipes and ductwork on or near walls or ceilings that are to be painted shall be painted, unless otherwise indicated.

E. Orange peel/rough finish on metal or wood surfaces shall not be permitted.

F. Provide primer coats for all walls and trim to receive a faux finish. Faux finishes are not included in this contract.

G. The number of coats and film thickness required is the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce a smooth, even surface, in accordance with the manufacturer's directions.

H. Apply additional coats when undercoats show through final coat of paint, until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry-film-thickness equivalent to that of flat surfaces.

I. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, grilles and similar components are in place. Extend coatings in these areas to maintain system integrity and provide desired protection.

J. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.

K. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, nonspecular black paint.

L. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.

M. The back of hollow metal-exterior door frames shall be finished with a mastic primer, from the bottom of the door to 18 inches above the finish floor.

N. Omit primer on metal surfaces that have been shop-primed and touch up painted.

O. Sand lightly between each succeeding enamel or varnish coat.

P. Scheduling Painting: Apply first-coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable, and before subsequent surface deterioration. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure and where application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

Q. Minimum Coating Thickness: Apply materials at the manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by the manufacturer.

R. Block Fillers: Apply block fillers to concrete masonry unit at a rate to ensure complete coverage with pores filled.

S. Prime Coats: Before application of finish coats, apply a prime coat of material as recommended by the manufacturer to material required to be painted or finished, and has not been prime coated by others.

1. Recoat primed and sealed substrates where evidence of suction spots or unsealed areas in the first coat appears, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

T. Brush Application: Brush-out and work brush coats into surfaces in an even film. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Draw neat glass lines and color breaks.

1. Apply primers and first coats by brush unless manufacturer's instructions permit use of mechanical applicators.

U. Mechanical Applications: Use mechanical methods for paint application when permitted by manufacturer's recommendation, governing ordinances, and trade union regulations.

1. Wherever spray application is used, apply coat to provide the equivalent hiding of brush-applied coats. Do not double-back with spray equipment building-up film thickness of two coats in one pass unless recommended by the manufacturer.

V. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirement.

3.6 FIELD QUALITY CONTROL

A. The Owner reserves the right to engage the services of an independent testing laboratory to sample and test paint material being used. Samples of material delivered to the project will be taken, identified, sealed, and certified in the presence of the Contractor.

1. The testing laboratory will perform appropriate tests as required by the Owner.

2. If tests show material being used does not comply with specified requirements, the Contractor may be directed to stop painting pay for testing, repaint surfaces coated with reject paint, remove rejected paint from previously painted surfaces if, upon repainting with the specified paint, the two coatings are non-compatible.

3.7 CLEAN UP AND PROTECTION

A. During the progress of the work, remove from the site all discarded paint materials, rubbish, cans, and rags at the end of each workday.

B. Remove splashed, dropped, spattered, and spilled paint from hardware, fixtures, glass, and building parts.

C. Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing, or replacing, and repainting as acceptable to the Architect.

D. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.

E. At the completion of work of other trades, and after notification in writing to the Contractor, touch-up and restore all damaged or defaced painted surfaces. A touch-up allowance will be included in final contract.

3.8 PAINT SCHEDULE

3.8.1 COLOR SCHEDULE

Interior Building Colors (Color numbers based on Sherwin Williams Paints) Refer to schedules for color location; multiple color selections will be used for interior building elements.

A. IP-1 Eggshell Finish – Front Porch SW 7651 (Accent color)
B. IP-2 Eggshell High Performance Finish- Snow Bound SW 7004 (based color)
C. IP-3 Epoxy Eggshell Finish– Egret White SW 7570 (Corridor) (Architect to confirm)
D. IP-4 Eggshell Finish– Sensible Hue SW 6198 (Toilet walls) (Architect to confirm)
E. IP-5 Flat Finish– High Reflective White SW 7757 (Ceiling rooms)
F. IP-6 Semi-gloss High Performance Finish– (Hollow metal door frames)

3.8.2 PAINT SYSTEMS AND COATING SCHEDULE

Refer to the Drawings for the materials for the application of the various interior paint finish types (letter designation) scheduled below. Provide finish scheduled below if not indicated on the Drawings or Finish Schedule on the Drawings.

A. THE SHERWIN WILLIAMS COMPANY: Attached are the Material Supplier's detailed prime and finish coats specifications. This defines primer and finish coat names, product number designations, and thickness. Because this supplier is providing a warranty, strict adherence to product Data Sheet and label instructions shall be followed. The following schedule shall not be considered as entirely inclusive, but construed as a general guide for complete painting of buildings, structures, etc., including, but not limited to, storage spaces, recesses, returns, reveals, soffits, haunches, forming part of a particular surface, room or space, pipes, conduits, duct work, panels, mechanical equipment, etc.

FINISH TYPE	Wet Film Thickness MILS	Dry Film Thickness MILS	Spread Rate SF/Gal.
A1. Interior Concrete - Prime Only			

1st coat	Sherwin Williams Loxon Concrete & Masonry Primer, A24W300	8.0	3.2	200

A2. Interior Concrete - Flat Finish

1st coat	Sherwin Williams Loxon Concrete & Masonry Primer, A24W300	8.0	3.2	200
2nd coat	Sherwin Williams Pro/Mar 700 Latex Flat B30W7700	4.0	1.1	300
	TOTAL DRY MILS		1.4	

A3. Interior Concrete - Semi Gloss Finish

1st coat	Sherwin Williams Loxon Concrete & Masonry Primer, A24W300	8.0	3.2	200
2nd coat	Sherwin Williams Pro/Mar 700 Latex Semi-gloss B31W7700	4.0	1.3	300
	TOTAL DRY MILS		4.5	

A4. Concrete Floor Stain

1st coat	H&C Concrete Sealer Solid Color Solvent Based thinned 25%	175
2nd coat	H&C Concrete Sealer Solid Color Solvent Based full strength	200

A5. Concrete Floor Sealer - Clear

1st coat	Concrete Sealer H & C Concrete & Masonry Waterproofing Sealer

B1. Interior (Face) Concrete Block - Prime Only / Exterior Walls (Dry Lock-Alternate)

1st coat	Sherwin Williams Water Blocking Primer Finish Interior Latex, B72W08010	8.0	3.7	75

B2. Interior Concrete Block - Flat Finish

1st coat	Sherwin Williams Prep Rite Block Filler B25W25	16.0	8.0	87-108
2nd coat	Sherwin Williams Pro/Mar 700 Latex Flat B30W7700	4.0	1.1	300

	TOTAL DRY MILS		9.1	

B3. Interior Concrete Block - Semi Gloss Finish

1st coat	Sherwin Williams Prep Rite Block Filler B25W25	16.0	8.0	87-108
2nd coat	Sherwin Williams Pro/Mar 700 Latex Semi-gloss B31W7700	4.0	1.3	300
	TOTAL DRY MILS		9.3	

C1. Interior Plaster Veneer - Prime Only

1st coat	Sherwin Williams Loxon Concrete & Masonry Primer, A24W300	8.0	3.2	200

C2. Interior Plaster Veneer - Flat Finish

1st coat	Sherwin Williams Loxon Concrete & Masonry Primer, A24W300	8.0	3.2	200
2nd coat	Sherwin Williams Pro/Mar 700 Latex Flat B30W7700	4.5	1.4	300
3rd coat	Sherwin Williams Pro/Mar 700 Latex Flat B30W7700	4.0	1.1	300
	TOTAL DRY MILS		5.7	

C3. Interior Plaster Veneer - Eggshell Finish

1st coat	Sherwin Williams Loxon Concrete & Masonry Primer, A24W300	8.0	3.2	200
2nd coat	Sherwin Williams Pro/Mar 400 Zero VOC Int. Latex Eg-Shel, B20-4600	4.0	1.3	300
3rd coat	Sherwin Williams Pro/Mar 400 Zero VOC Int. Latex Eg-Shel, B20-4600	4.0	1.3	300
	TOTAL DRY MILS		6.8	

C4. Interior Plaster Veneer – Semi-Gloss Finish

1st coat	Sherwin Williams Loxon Concrete & Masonry Primer, A24W300	8.0	3.2	200

2nd coat	Sherwin Williams Pro/Mar 700 Latex Semi Gloss B30W7700	4.5	1.3	300
3rd coat	Sherwin Williams Pro/Mar 700 Latex Semi-Gloss B30W7700	4.5	1.3	300
	TOTAL DRY MILS		6.8	

D1. Interior Gypsum Board - Prime Only

1st coat	Sherwin Williams ProMar 400 Zero VOC Int. Latex Primer, B28W04600	4.0	1.1	300

D2. Interior Gypsum Board - Flat Finish

1st coat	Sherwin Williams ProMar 400 Zero VOC Int. Latex Primer, B28W04600	4.0	1.1	300
2nd coat	Sherwin Williams Pro/Mar 700 Latex B28W7700	4.0	1.1	300
3rd coat	Sherwin Williams Pro/Mar 700 Latex B28W7700	4.0	1.1	300
	TOTAL DRY MILS		3.3	

D3. Interior Gypsum Board - Eggshell Finish

1st coat	Sherwin Williams ProMar 400 Zero VOC Int. Latex Primer, B28W04600 Build Primer B28W601	4.0	1.1	300
2nd coat	Sherwin Williams Pro/Mar 400 Zero VOC Int. Latex Eg-Shel, B20-4600	4.0	1.3	300
3rd coat	Sherwin Williams Pro/Mar 400 Zero VOC Int. Latex Eg-Shel, B20-4600	4.0	1.3	300
	TOTAL DRY MILS		3.7	

D4. Interior Gypsum Walls to Receive Wallcovering

1st coat Multi-Purpose Int/Ext Latex Primer/Sealer, B51-450 Series

E1. Interior Metal Doors and Frames - Prime Only

1st coat	Sherwin Williams Kem Kromik Universal Metal Primer B50 Series	6.0	3.0	200

E2. Interior Metal Doors and Frames - Factory Primed

1st coat	Sherwin Williams Kem Kromik Universal Metal Primer B50 Series (spot prime)	6.0	3.0	200
2nd coat	Sherwin Williams Pro/Mar 200 Alkyd Semi-Gloss B34-200	4.0	1.7	300
3rd coat	Sherwin Williams Pro/Mar 200 Alkyd Semi-Gloss B34-200	4.0	1.7	300
	TOTAL DRY MILS		6.4	

E3. Interior Metal Handrails

1st coat	Sherwin Williams Kem Kromik Universal Metal Primer B50 Series (spot prime)	6.0	3.0	200
2nd coat	Sherwin Williams Industrial Enamel B54 Series	5.0	2.0	300
3rd coat	Sherwin Williams Industrial Enamel B54 Series	5.0	2.0	300
	TOTAL DRY MILS		7.0	

E4. Mechanical and Structural Members Exposed to view

1st coat	Sherwin Williams Macropoxy 646 Fast Cure Epoxy, B58-600 Series	7.0	5.0	136-227
2nd coat	Sherwin Williams Hi-Solids Polyurethane, B65-300 Series	4.0--8.0	3.0-5.0	215-250
	TOTAL DRY MILS		8.0-10.0	

E5. Structural Steel

1st coat	Sherwin Williams Kem Kromik Universal Primer, B50 Series	6.0	3.0	274
2nd coat	Sherwin Williams Pro Industrial High Performance Acrylic, B66-600 Series	6.0	2.5	200
	TOTAL DRY MILS		5.5	

E6. Structural Steel Touch-Up

1st coat	Sherwin Williams Kem Kromik Universal Metal Primer B50 Series	6.0	3.0	300

E7. Interior Ferrous Metal / Exposed to view Fire Sprinkler Piping

(Refer to galvanized metal surface preparation if sprinkler piping is galvanized.)

1st & 2nd coats Each Coat	Sherwin Williams Kem Kromik Universal Metal Primer B50 Series	6.0	3.0	200
3rd coat	Sherwin Williams Pro Industrial High Performance Acrylic, B66-600 Series	6.0	2.5	200
	TOTAL DRY MILS		8.5	

E8. Unfinished Ferrous Metals

1st coat	Sherwin Williams Kem Kromik Universal Metal Primer B50 Series	6.0	3.0	200
2nd coat	Sherwin Williams Pro Industrial High Performance Acrylic, B66-600 Series	6.0	2.5	200
	TOTAL DRY MILS		5.5	

E9. Interior Exposed Mechanical Equipment - Shop Primed

Ferrous Metal Pretreatment: Remove all rust and mill scale prior to coating.

1st coat	Sherwin Williams Kem Kromik Universal Metal Primer B50 Series	6.0	3.0	200
2nd coat	Sherwin Williams Kem Kromik Universal Metal Primer B50 Series	6.0	3.0	200
3rd coat	Sherwin Williams Pro Industrial High Performance Acrylic, B66-600 Series	6.0	2.5	200
	TOTAL DRY MILS		8.5	

E10. Interior Surfaces of Ducts Where Visible Through Registers or Grilles

1st coat	Sherwin Williams Pro Industrial Multi-Surface Acrylic, B66-560 Series Black	3.75	1.5	

E11. Galvanized Metal

(If Galvanized Metal is Surface Treated, must Solvent Clean with Biodegradable Cleaner)

1st coat	Sherwin Williams Pro Industrial Pro-Cryl Universal Primer, B66-310 Series	6.0	3.0	264

2nd coat	Sherwin Williams Pro Industrial High Performance Acrylic, B66-600 Series	6.0	2.5		

E12. Galvanized Surface touch-up

1st coat	Sherwin Williams Pro Industrial Pro-Cryl Universal Primer, B66-310 Series	6.0	3.0	200

E13. Copper Piping Exposed to view

1st coat	Sherwin Williams Multi-Purpose Int/Ext Latex Primer/Sealer, B51-450 Series	4.0	1.4	200
2nd coat	Sherwin Williams Pro Industrial High Performance Acrylic, B66-650 Series	6.0	2.5	200
	TOTAL DRY MILS		3.9	

E14. Exposed (Non-copper) Piping (Except Black Mastic Drain Pipes)

1st coat	Sherwin Williams Macropoxy 646 Fast Cure Epoxy, B58-600 Series	7.0	5.0	136-227
2nd coat	Sherwin Williams Macropoxy 646 Fast Cure Epoxy, B58-600 Series 646 Series	7.0	5.0	136-227
3rd coat	Pro Industrial High Performance Acrylic, B66-660 Series	6.0	2.5	200
	TOTAL DRY MILS		12.5	

E15. Unprimed Ferrous Metal and Overhead Grille Brackets

Pretreatment: Clean in accordance with Paragraph 1.11D.

1st coat	Sherwin Williams Kem Kromik Universal Metal Primer B50 Series	6.0	3.0	200
2nd coat	Sherwin Williams Industrial Enamel, B54 Series, Gloss Enamel Gloss	5.0	2.0	300

F1. Interior Wood Doors, Frames, and Base - Prime Only
Pretreatment: Fill all holes wit Dap Fast & Final Spackle. Caulk all open joints with Sherwin Williams C1050 Acrylic Silicone Latex Caulk.

1st Coat	Sherwin Williams Premium Wall & Wood Primer Int. Latex Primer, B28W8111	4.0	1.8	300

F2. Interior Wood Base and Running Trim Back Primer

1st coat	Sherwin Williams Premium Wall & Wood Primer Int. Latex Primer, B28W8111	4.0	1.8	300

F3. Interior Wood Doors, Frames, Trim and Base – Semi-Gloss

Caulk and Putty Pretreatment: Fill all holes with Dap Fast and Final Spackle. Caulk all open joints with Sherwin Williams C1050 Acrylic Silicone Latex Caulk.

1st coat	Sherwin Williams Premium Wall & Wood Primer Int. Latex Primer, B28W8111	4.0	1.8	300
2nd coat	Sherwin Williams Pro/Mar 200 Alkyd Semi-Gloss B34W200	4.0	1.7	300
3rd coat	Sherwin Williams Pro/Mar 200 Alkyd Semi-Gloss B34W200	4.0	1.7	300
	TOTAL DRY MILS		5.2	

F4. Interior Wood Stain and Sealer

1st coat	Sherwin Williams Wood Classics Interior Oil Stain, A49-200 Series	3.0-3.5	0	450-550
2nd coat	Sherwin Williams Wood Classics Polyurethane Varnish, Gloss A67V1	4.0	1.7	350-400
3rd coat	Sherwin Williams Wood Classics Polyurethane Varnish, Satin A67 Series	4.0	1.7	350-400
	TOTAL DRY MILS		3.4	

* Wood floors to receive (4) four coats of sealer; refer to Section 09640 for coating requirements. Initial coats to be thinned.

F5. Terminal and Telephone Boards

1st coat	Flame Control 20-20	8.5	4.5	190
2nd coat	Flame Control 20-20	8.5	4.5	190
	TOTAL DRY MILS		9.0	

G1. Interior PVC Piping Exposed to view

1st coat	Multi-Purpose Int/Ext Latex Primer/Sealer, B51-450 Series	4.0	1.4	200

2nd coat	Sherwin Williams PM 400 Zero VOC Int. Flat, B30-4600 Series			
		4.0	1.2	300
	TOTAL DRY MILS		2.6	

S2. Interior Sealant

C-950 Acrylic Sealant

END OF SHERWIN WILLIAMS COMPANY PAINT SYSTEMS SCHEDULE

END OF SECTION 09912

SECTION 09960 – HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Provisions and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surface preparation and painting of exterior metal tube beams and beam support columns and exterior metal components.

B. Related Sections:

1. Division 5 Section “Metal Fabrications.”
2. Division 9 Section “Exterior Painting” for surface preparations, painting, and finishing of all other exposed exterior items and surfaces.

1.3 REFERENCE SPECIFICATIONS AND STANDARDS

A. Without limiting the general aspects of other requirements of these specifications, all surface preparation, coating and painting of surfaces shall conform to the applicable requirements of the Steel Structures Painting Council, NACE, ICRI and the manufacturer's printed instructions.

B. The Architect’s decision shall be final as the interpretation and/or conflict between any of the referenced specifications and standards contained herein.

1.4 APPLICATOR CERTIFICATIONS

A. The Applicator shall have five years practical experience and successful history in the application of specified products in similar projects. This requirement shall be substantiated by furnishing a list of references and job completions.

B. Applicator must successfully demonstrate to the product manufacturer the ability to apply the material correctly and within the confines of the specifications. The Applicator must provide a letter from the manfacture stating their acceptance of the Applicator for this project to apply these products.

C. The Applicator shall possess the applicable license to perform the work as herein described and as specified by local, state and federal laws.

1.5 QUALITY ASSURANCE

A. General: Quality assurance procedures and practices shall be utilized to monitor all phases of surface preparation, application, and inspection throughout the duration of the project. Procedures or practices not specifically defined herein may be utilized provided they meet recognized and accepted professional standards and are approved by the Architect.

B. Surface Preparation: Surface preparation will be based upon comparison with: "Pictorial Surface Preparation Standards for Painting Steel Surfaces", SSPC-Vis-1 and ASTM Designation D2200; "Standard Methods of Evaluating Degree of Rusting on Painted Steel Surfaces" SSPC-Vis-2 and ASTM Designation D610; and ICRI CSP Surface Profile Chips.

C. Application: No coating or paint shall be applied: When the surrounding air temperature or the temperature of the surface to be coated is below the minimum required temperature for the specified product; to wet or damp surfaces or in fog or mist; when the temperature is less than 5 degrees F. above the dewpoint; when the air temperature is expected to drop below 40 degrees F. within six hours after application of coating. Dewpoint shall be measured by use of an instrument such as a Sling Psychrometer in conjunction with U.S. Department of Commerce Weather Bureau Psychrometric Tables. If above conditions are prevalent, coating or painting shall be delayed or postponed until conditions are favorable. The day's coating or painting shall be completed in time to permit the film sufficient drying time prior to damage by atmospheric conditions.

D. Thickness and Holiday Checking: Thickness of coatings and paint shall be checked with a non-destructive, magnetic type thickness gauge. The integrity of coated interior surfaces shall be tested with an approved inspection device. Non-destructive holiday detectors shall not exceed the voltage recommended by the manufacturer of the coating system. For thicknesses between 10 and 20 mils (250 microns and 500 microns), a non-sudsing type wetting agent, such as Kodak Photo-Flo, may be added to the water prior to wetting the detector sponge. All pinholes shall be marked, repaired in accordance with the manufacturer's printed recommendations, and retested. No pinholes or other irregularities will be permitted in the final coating.

E. Inspection Devices: The Contractor shall furnish, until final acceptance of coating and painting, inspection devices in good working condition for detection of holidays and measurement of dry-film thickness of coating and paint. The Contractor shall also furnish U.S. Department of Commerce; National Bureau of Standard certified thickness calibration plates to test accuracy of dry film thickness gauges and certified instrumentation to test accuracy of holiday detectors.

F. All necessary testing equipment shall be made available for the Architect’s use at all times until final acceptance of application. Holiday detection devices shall be operated in the presence of the Architect.

1. 6 SAFETY AND HEALTH REQUIREMENTS

A. General: In accordance with requirements set forth by regulatory agencies applicable to the construction industry and manufacturer's printed instructions and appropriate technical bulletins and manuals, the Contractor shall provide and require use of

personnel protective lifesaving equipment for persons working on or about the project site.

B. Head and Face Protection and Respiratory Devices: Equipment shall include protective helmets, which shall be worn by all persons while in the vicinity of the work. In addition, workers engaged in or near the work during sandblasting shall wear eye and face protection devices and air purifying halfmask or mouthpiece respirators with appropriate filters. Barrier creams shall be used on any exposed areas of skin.

C. Ventilation: Where ventilation is used to control hazardous exposure, all equipment shall be explosion-proof. Ventilation shall reduce the concentration of air contaminant to the degree a hazard does not exist. Air circulation and exhausting of solvent vapors shall be continued until coatings have fully cured.

D. Sound Levels: Whenever the occupational noise exposure exceeds maximum allowable sound levels, the Contractor shall provide and require the use of approved ear protective devices.

E. Illumination: Adequate illumination shall be provided while work is in progress, including explosion-proof lights and electrical equipment. Whenever required by the Architect, the Contractor shall provide additional illumination and necessary supports to cover all areas to be inspected. The Architect shall determine the level of illumination for inspection purposes.

F. Confined Space: When applicable it is mandatory that all work be performed in compliance with OSHA'S rules and regulations for working in confined space. Atmospheres within confined spaces as defined by the Occupational Safety and Health Administration are classified as being either a Class A, Class B or Class C environment.

PART 2 - PRODUCTS

2.1 GENERAL

A. Materials specified are those that have been evaluated for the specific service. Products of the Tnemec Co. are listed to establish a standard of quality. Equivalent materials of other manufacturers may be substituted on written approval of the Architect.

Basis of Design: Tnemec Company, Incorporated –Florida Protective Coatings. Contact is Mr. Chad Holmes (727) 201-6706 or cholmes@tnemec.com.

Requests for substitution shall include manufacturer's literature for each product giving the name' product number, generic type, descriptive information, solids by volume, recommended dry film thickness, cost savings and certified test reports showing results to equal the performance criteria of the products specified herein. No request for substitution shall be considered that will decrease film thickness, the number of coats or offer a change in the generic type of coatings specified. In addition, a list of five similar projects shall be submitted in which each product has been used and rendered satisfactory service.

Requests for product substitution shall be made in accordance with Division 01.

Manufacturer's color charts shall be submitted to the Architect and Owner at least 30 days prior to paint application. Contractor and painting contractor shall coordinate work so as to allow sufficient time (five to ten days) for paint to be delivered to the jobsite.

B. All materials shall be brought to the jobsite in original, sealed containers. They shall not be used until the Architect has inspected contents and obtained data from information on containers or labels. Materials exceeding storage life recommended by the manufacturer shall be rejected.

C. All coatings and paints shall be stored in enclosed structures to protect them from weather and excessive heat or cold. Flammable coatings or paint must be stored to conform to City, County, State and Federal safety codes for flammable coating or paint materials. At all times, coating and paints shall be protected from freezing.

D. A NACE certified technical representative from the paint manufacturer shall visit the job site to support the Contractor's personnel, the Owner and/or the Architect as needed and/or requested. Visits shall be made as needed to help with hold points for the Owner or Architect. Additional visit shall be made as needed and/or requested by Owner, Architect or Contractor. 48 hours' notice is required by the Contractor for each hold point inspection.

E. All parties, to include the owner or Owner's designated representative, Architect, Contractor, installer, any subs and the product manufacture, shall meet prior to any work is started to review the spec and discuss job specific expectations, need and requirements

F. Coating Systems:

Exterior Exposed Surfaces

Structural Steel and all Misc. Metal:

Surface Preparation: SSPC-SP6/NACE 3 Commercial Blast Cleaning. The surface shall be clean and dry.

1st Coat: Tnemec Series 90-97 Tneme-Zinc @ 2.5 – 3.5 dry mils.
2nd Coat: Tnemec Series N69 Hi-Build Epoxoline II applied at 4.0 – 6.0 dry mils.
3rd Coat: Tnemec Series 740 UVX applied at 3.0 – 5.0 dry mils.

Galvanized Metal:

Surface Preparation: SSPC-SP1 Solvent Cleaning. Remove all soluble and insoluble contaminants and corrosion. Remove any storage stains per Section 6.2 of ASTM D6386. Sweep (Abrasive) Blasting per ASTM D 6386 to achieve a uniform anchor profile (1.0 - 2.0 mils).

1st Coat: Tnemec Series N69 Hi-Build Epoxoline II applied at 2.0 – 6.0 dry mils.

2nd Coat: Tnemec Series 740 UVX applied at 3.0 – 5.0 dry mils.

PART 3 - EXECUTION

3.1 GENERAL

A. All surface preparation, coating and painting shall conform to applicable standards of the Steel Structures Painting Council, NACE, ICRI and the manufacturer's printed instructions. Material applied prior to approval of the surface by the Architect shall be removed and reapplied to the satisfaction of the Architect at the expense of the Contractor.

B. All work shall be performed by skilled craftsmen qualified to perform the required work in a manner comparable with the best standards of practice. Continuity of personnel shall be maintained and transfers of key personnel shall be coordinated with the Architect.

C. The Contractor shall provide an English speaking supervisor at the work site during cleaning and application operations. The supervisor shall have the authority of sign change orders, coordinate work, and make decisions pertaining to the fulfillment of the contract.

D. Dust, dirt, oil, grease or any foreign matter that will affect the adhesion or durability of the finish must be removed by washing with clean rags dipped in an approved cleaning solvent and wiped dry with clean rags.

E. The Contractor's coating and painting equipment shall be designed for application of materials specified and shall be maintained in first class working condition. Compressors shall have suitable traps and filters to remove water and oils from the air. Contractor's equipment shall be subject to approval of the Architect.

F. Application of the first coat shall follow immediately after surface preparation and cleaning and before rust bloom or flash rusting occurs. Any cleaned areas not receiving first coat within this period shall be re-cleaned prior to application of first coat.

3.2 SURFACE PREPARATION

A. The latest revision of the following surface preparation specifications of the Steel Structures Painting Council and NACE shall form a part of this specification:

1. Solvent Cleaning (SSPC-SP1): Removal of oil, grease, soil and other contaminants by use of solvents, emulsions, cleaning compounds, steam cleaning or similar materials and methods which involve a solvent or cleaning action.

2. Hand Tool Cleaning (SSPC-SP2): Removal of loose rust, loose mill scale and other detrimental foreign matter to degree specified by hand chipping, scraping, sanding and wire brushing.

3. Power Tool Cleaning (SSPC-SP3): Removal of loose rust' loose mill scale and other detrimental foreign matter to degree specified by power wire brushing, power impact tools or
power sanders.

4. Brush-Off Blast Cleaning (SSPC-SP7/NACE 4): Brush-off blast cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust, and loose coating. Tightly adherent mill scale, rust, and coating may remain on the surface. Mill scale, rust, and coating are considered tightly adherent if they cannot be removed by lifting with a dull putty knife after abrasive blast cleaning has been performed.

5. Commercial Blast Cleaning (SSPC-SP6/NACE 3): Blast cleaning until at least 66 percent of each element of surface area is free or all visible residues.

6. Near White Blast Cleaning (SSPC-SP10/NACE 2): Blast cleaning to nearly white metal cleanliness, until at least 95 percent of each element of surface area is free of all visible residues.

7. Surface Preparation of Concrete (SSPC-SP13/NACE 6): This standard gives requirements for surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems.

8. Power Tool Cleaning to Bare Metal (SSPC-SP11): This standard covers the requirements for power tool cleaning to produce a bare metal surface and to retain or produce a minimum 25 micrometer (1.0 mil) surface profile. This standard is suitable where a roughened, clean, bare metal surface is required, but where abrasive blasting is not feasible or permissible.

B. Blast cleaning for all surfaces shall be by dry method unless otherwise directed.

C. Particle size of abrasives used in blast cleaning shall be that which will produce a 1.5 – 2.0 mil (37.5 microns - 50.0- microns) surface profile or in accordance with recommendations of the manufacturer of the specified coating or paint system to be applied.

D. Abrasive used in blast cleaning operations shall be new, washed, graded and free of contaminants that would interfere with adhesion of coating or paint and shall not be reused unless specifically approved by the Architect.

E. During blast cleaning operations, caution shall be exercised to insure that surrounding existing coatings or paint are not exposed to abrasion from blast cleaning.

F. The Contractor shall keep the area of his work and the surrounding environment in a clean condition. He shall not permit blasting materials to accumulate as to constitute a nuisance or hazard to the accomplishment of the work, the operation of the existing facilities, or nuisance to the surrounding environment.

G. Blast cleaned surfaces shall be cleaned prior to application of specified coatings or paint. No coatings or paint shall be applied over damp or moist surfaces.

H. Specific Surface Preparation: Surface preparation for the specific system shall be as noted in Section 2.01 Paragraphs D.

3.3 APPLICATION, GENERAL

A. Coating and paint application shall conform to the requirements of the Steel Structures Painting Council Paint Application Specification SSPC-PA1, latest revision, for "Shop, Field and Maintenance Painting," and the manufacturer of the coating and paint materials.

B. Thinning shall be permitted only as recommended by the manufacturer approved by the Architect, and utilizing the thinners stated in Section 2.01 Paragraphs D.

C. Each application of coating or paint shall be applied evenly, free of brush marks, sags, runs, with no evidence of poor workmanship. Care shall be exercised to avoid lapping on glass or hardware. Coatings and paints shall be sharply cut to lines. Finished surfaces shall be free from defects or blemishes.

D. Protective coverings or drop cloths shall be used to protect floors, fixtures, and equipment. Care shall be exercised to prevent coatings or paint from being spattered onto surfaces that are not to be coated or painted. Surfaces from which materials cannot be removed satisfactorily shall be recoated or repainted as required to produce a finish satisfactory to the Architect.

E. When two coats of coating or paint are specified, where possible, the first coat shall contain sufficient approved color additive to act as an indicator of coverage or the two coats must be of contrasting color.

F. Film thickness per coat specified in Section 2.01 Paragraphs F are minimum required. If roller application is deemed necessary, the Contractor shall apply additional coats as to achieve the specified thickness.

G. All material shall be applied as specified, unless approved in writing by the Architect.

H. All welds, edges and other irregular surfaces shall receive a brush coat of the specified product prior to application of the first complete coat.

3.4 COATING SYSTEMS APPLICATION

A. After completion of surface preparation as specified for the specific system, materials shall be applied as noted in Section 2.01 Paragraphs D.

3.5 COLOR SCHEME

A. Colors: Submittals will be made to the Architect and Owner for approval prior to application.

3.6 SOLVENT VAPOR REMOVAL

A. Where appropriate all solvent vapors shall be completely removed by suction-type exhaust fans and blowers before placing in operating service.

3.7 CLEAN UP

A. Upon completion of the work, all staging, scaffolding, and containers shall be removed from the site or destroyed in a manner approved by the Architect. Coating or paint spots and oil or stains upon adjacent surfaces shall be removed and the jobsite cleaned. All damage to surfaces resulting from the work of this section shall be cleaned, repaired, or refinished to the satisfaction of the Architect at no cost to the Owner.

3.8 WARRANTY

A. The Contractor will warrant the work free of defects in material and workmanship for a period of one year from the acceptance of the work. At the end of one year, the Contractor will return for a one-year anniversary inspection of the work. The Contractor will correct any deficiencies found with no cost to the owner. Inspections shall be conducted in to conform to owners spec.

END OF SECTION 09960

SECTION 10101 – VISUAL DISPLAY UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 DESCRIPTION OF WORK

A. Section Includes:

1. Wall-mounted, Coated Acrylic Dry-Erase Markerboards frameless with polished metal standouts.
2. Tack Boards.
3. Pull-Down Map. (Customized for Airport.)

1.3 REFERENCED STANDARDS

A. Underwriter’s Laboratory

1. Flammability – UL 94: Rating = 94HB; Class A

B. American Society for Testing Materials

1. ASTM B221 Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wires, Profiles and Tubes
2. Note: ASTM E84 - Standard Test Method for Surface Burning Characteristics for Building Materials - not applicable to determine smoke density for thermoplastics

C. American National Standards Institute (ANSI)

1. ANSI Z 97.1 Approved for Safety Glazing Materials Used in Buildings

D. Indoor Air Quality

1. Products have extremely low residual monomers – evidenced by the product being used in museum-quality art framing where outgassing would not be acceptable.

1.4 SUBMITTALS

A. Manufacturer's Instructions: Provide manufacturer's installation instructions.

B. Drawings: Provide dimensions for placement of each visual display unit as required.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Manufacturer shall have a minimum of 3 years experience in the manufacture of visual display boards.

B. Operation and Maintenance: Include data on regular cleaning, stain removal, and precautions.

1.6 PROJECT CONDITIONS

A. Field measure prior to installation and/or fabrication to ensure proper fit.

B. Comply with manufacturer's recommendations for acclimating area for interior moisture and temperature to approximate normal occupied conditions.

1.7 DELIVERY, STORAGE AND HANDLING

A. Schedule delivery of visual display boards with area sufficiently complete to allow installation after delivery.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Store materials protected from exposure to harmful weather conditions and at temperatures and humidity conditions recommended by manufacturer.

1.8 WARRANTY

A. Submit that under normal usage and maintenance, and when installed in accordance with manufacturer's instructions and recommendations, markerboards are warrantied for five years from the date of installation.

PART 2 - PRODUCTS

2.1 CORK BOARD WITH REINFORCEMENT

A. 4’-0” X 6’-0” wood framed cork and remarkaboard combination, as manufactured by Marsh Industries, Inc. Model # CW-406M, with ¼” thick fine grained natural cork and ¼” hardboard and full-length self tray. www.march-ind.com (303) 308-8865.

B. Framed Markerboards

   1. Basis of Design: Pro-Rite Markerboard, by Marsh Industries, Inc.

   2. Face Sheet Material: Porcelain enamel coated 24gauge steel.

   3. Face Sheet Material Standard: Manufactured in accordance with Porcelain Enamel Institute’s S-104 Performance Specification for Porcelain Enamel Markerboards and Chalkboards. Porcelain enamel finish shall be fusion bonded to steel substrate at lowest possible temperature to reduce steel and porcelain stresses and achieve superior enamel bond and hardness.

4. Core Material: ½" (12.7mm) Class"A" Rated Micore.

5. Panel Backing: (92gauge) Mylar Panel.

6. Laminations: Hot-type neoprene contact adhesive applied to both surfaces, each substrate having a minimum of 80% covering with 1.5-2.0 dry milos (0.038-0.051 mm) of adhesive. Panel components shall have uniform pressure applied mechanically over entire area. Laminations shall be made by face sheet manufacturer.

7. Size: As indicated on Drawings- 48" high maximum.

8. Color: White

9. Trim: Clear adonized satin finish.

10. Marker Tray: Continuous, shelf type aluminum tray with rounded edges; clear satin adonized aluminum.

11. Pro-Rite Markers- 1 Dozen assorted colors/ marker bowl.

12. Mar: Kleen Marker Board cleaner for each markerboard.

13. Brush eraser for each markerboard.

2.2 PULL DOWN MAP

A. By Owner.

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

A. Verify before installation that wall surfaces are true and plumb and are prepared and ready to receive markerboards and are not outside normal conditions (e.g. through dampness or lack of heat).

3.2 INSTALLATION

A. Handle and store markerboards in such a way as to prevent damage prior to installation.

B. Unpack items as near as practical to final installation location(s).

C. Remove markerboards and/or accessories from shipping containers with care to prevent damage to markerboard surfaces and metal frames.

D. Refer to drawings and schedules for mounting heights and locations.

E. Install level and plumb.

F. Coordinate installation with other finishes at mounting locations.

G. Secure framed cork board and markerboards with concealed mechanical fasteners, counter sunk within the frame.

H. Coordinate wood blocking concealed in wall for mounting of visual display units.

3.3 ADJUST AND CLEAN

A. Verify that all accessories are installed as required for each unit.

B. At completion of work, clean surfaces and trim in accordance with manufacturer's recommendations, leaving all materials ready for use.

END OF SECTION 10101

SECTION 10200 - LOUVERS AND DAMPERS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Furnish all labor, materials, tools, equipment, etc. and services necessary and incidental to the complete fabrication, furnishing and erection of this section as shown, noted, detailed and reasonably implied on the Drawings and in the Specifications.

B. Refer to Mechanical Drawings and Specifications for additional louver requirements.

1.3 RELATED SECTIONS

A. Coordinate work of this Section with work of other Sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other Sections, including:

1.4 SUBMITTAL DATA AND SAMPLES

A. Submit shop drawings and product data under provisions of Section 01330 – Shop Drawings, Product Data and Samples.

B. Shop drawings showing locations of all louvers, size, shape and gauge of metal, method of anchoring, flashing, bracing and connect to work of other trades.

C. Draw profiles, sections, overall details, dimensions, and views of items at a scale large enough to permit checking for design conformity.

D. Submit manufacturer's printed data describing products, specifications, and their installations.

E. Submit engineering certifications, or FBC approved NOA certification, listed in Article 1.6 of this Section, demonstrating compliance with the wind loads shown on the Structural Drawings.

1.5 DELIVERY, STORAGE AND HANDLING

A. All materials shall be delivered to the project site in their original unbroken containers, bearing manufacturer's name and brand designation and specification number.

B. All materials shall be stored in a secured, dry and protected area, a minimum of 4 inches above concrete slab, and in accordance with Section 01600 – Materials and Equipment and Section 01620 – Storage and Protection.

1.6 DESIGN CRITERIA

A. Comply with the Florida Building Code – Latest Edition in effect and NFPA 101 – Current Edition. Nothing in this Section shall be construed as allowing or requiring noncompliance with the Code.

B. Design wind pressures, uplift loads and design wind speed shall be per FBC.

C. Wind pressures act perpendicular to flat surfaces, regardless of surface orientation. Wind pressures act perpendicular to tangents of curved surfaces. At corners and changes in plane, adjacent surfaces shall be assumed to experience the worst case combination of inward pressure simultaneously, outward pressure simultaneously, and simultaneous occurrence of inward pressure on one surface and outward pressure on adjoining surface.

D. A registered structural Engineer in the State of Florida shall design structural supports and anchors. (Also, the Engineer shall certify structural capacity of the louvers and dampers to be installed meet above design wind pressure.) Submit design calculations for information only.

1.7 WARRANTY

A. Refer to Section 01770 - Closeout Procedures, Detail Requirements and Section 01740 Warranties and Bonds.

B. Louver manufacturer shall supply in writing, at job completion, a ten (10) year warranty against failure of the powder coat finish, Powder Coat complying with AAMA 2604.criteria finish.

PART 2 – PRODUCTS

2.1 MATERIALS

A. The basis of design is Extruded Drainable Blade Louvers and Counterbalanced Relief Dampers (where scheduled) as manufactured by Greenheck .

B. Equivalent products manufactured by Airolite, Mestec Louver Group, Ruskin Louver Co. or approved equal are acceptable.

C. Refer to the Drawings for the Louver sizes and dimensions.

2.2 ALUMINUM LOUVERS - EXTERIOR

A. Impact-resistant exterior louvers shall be Greenheck Model No. EHV-901D Dual Module FBC/ Miami Dade approved Louvers, 9 inches deep, fixed blades at 45-degree angle at 6” o.c. spacing. 54% free area and class A wind driven rain classification.

1. Louvers must conform to Florida Building Code. Louver frames shall be reinforced with rear-mounted heavy gage perimeter steel channel. Louver sections with rough openings greater than 36 inches in width shall be provided with steel blade reinforcing angles concealed from view.

B. Aluminum shall be 6063-T5 extruded.

C. Blades: Minimum 0.125 inches thick by 6 inches deep; louver blade to frame connections shall be both mechanically fastened with 300 series stainless steel threaded fasteners and welded.

D. Jambs: Minimum 0.125 inches (8 gauge) thick.

E. All vertical mullions shall be the exposed type to provide for drainage of water from the blades to the louver sill.

F. Fasteners: Spacing and size per manufacturer, as required to meet required wind loads.

2.3 ACCESSORIES

A. All exterior louvers shall receive an extruded bird screen frame with 1/2 inch mesh, 0.063 inch wire diameter of aluminum material.

B. Extruded aluminum sill extension, extension length as to match assembly width.

C. Furnish and install aluminum subsill flashings and gutter system with end dams, set in full bed of sealant, at louver base. Minimum 12 gauge, color to match louver.

2.4 LOUVER AND DAMPER SIZES AND LOCATION

A. Louver sizes as required for ventilation and mechanical systems.

2.5 FASTENERS

A. Fasteners of sizes required by paragraph 1.6 D. above, shall be stainless steel Type 300 Series.

2.6 FINISHES: LOUVERS AND DAMPERS

A. Aluminum louvers, dampers, and accessories shall be finished with manufacture’s standard ten (10) year warranty powder coating that meets or exceeds AAMA 2604 criteria of custom color to match the building exterior or interior as selected by the Architect.

2.7 FINISHES: STEEL SUPPORTS

A. All steel supports shall be hot-dipped galvanized and shall be painted per Section 09900 - Painting, colors as selected by the Architect.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

A. All items in this Section shall be installed by experienced skilled mechanics in the best workmanlike manner of the trade's best standard practice.

B. All items shall be installed true, level, plumb, and in strict accordance with the manufacturer's printed instructions and approved submittals.

3.2 INSTALLATION

A. Aluminum exterior and interior louvers and dampers shall be installed with stainless steel fasteners and/or anchors.

B. Where aluminum is placed in contact with dissimilar materials, the aluminum shall be back-painted before erection with zinc chromate paint or bituminous coating.

C. After erection, the Contractor shall adequately protect exposed portions of louvers from damage by stucco, lime, cement, welding, or other harmful compounds.

D. All exposed surfaces shall be free from scratches and other serious surface blemishes.

3.3 CLEANING

A. The Contractor shall be responsible for removal of protective materials and subsequent cleaning. The Contractor shall be held responsible for damages resulting from the use of cleaning materials.

3.4 MATERIALS AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and be replaced with new material in the best workmanlike manner at no extra cost to the Owner.

END OF SECTION 10200

SECTION 10350 - FLAGPOLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes ground-mounted flagpoles made from aluminum.

B. Owner-Furnished Material: All flags.

C. Related Sections:

1. Division 16 Section "Exterior Lighting" for site lighting fixtures.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to the following design criteria:

1. Wind Loads: 140 mph, Exposure B according to NAAMM FP 1001, "Guide Specifications for Design of Metal Flagpoles." ; Refer to FBC wind speed design criteria.
2. Base flagpole design on polyester flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.

    a. Flag size – Minimum = 6’ X 10’.
    b. Top Diameter of flagpole foundation shall be stepped and not to exceed 9” in diameter and shall extend 6” below grade before widening; the depth of the foundation shall be as required to maintain this dimension and shall be isolated from adjoining paver and seat wall foundations.
    c. Shoe base trim shall be flush with adjoining pavers.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.

1. Anchor bolts for flagpole.

2. Manufactured flagpole foundation.
3. Foundation & design analysis to comply with FBC wind speed requirements sealed by a professional engineer licensed in the State of Florida.
4. Concrete mix design and placement criteria for flagpole foundations.
5. Sealant data & Sealant compatibility statement from sealant manufacturer stating Sealant compatible with adjoining substrates to be sealed.
6. Maximum wind speed for flag flying.

B. Shop Drawings: For flagpoles and foundation system. Include plans, elevations, details, and attachments to other work. Show general arrangement, jointing, fittings, accessories, grounding, anchoring, and support.

1. Section and details of foundation system for ground-mounted flagpole.

a. Include reinforcement drawings for flagpole foundation.

b. Isolate foundation of flag pole from event court foundation.

c. Base plate trim to be flush with pavers and shall have weeps for drainage.

d. Refer to details on Drawings for coordination of intergral trim and concrete finishes.

2. Anchor-bolt templates keyed to specific flagpole and certified by manufacturer.
3. Design calculations, certified by the qualified licensed Professional Engineer responsible for their preparation, licensed in the State of Florida.

C. Delegated-Design Submittal: For flagpole assemblies and foundation system indicated to comply with performance requirements and design criteria, including analysis data, project specific-foundation design signed and sealed by the qualified professional engineer responsible for their preparation.

D. Qualification Data: For qualified Licensed Professional Engineer.

E. Recycled content for sustainable design requirements, and other mnfg's certifications per Division 1 Section "Sustainable Design Requirements."

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain flagpole as complete unit, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. General: Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: American Flagpole; a Kearney-National Inc. company – Basis-of-Design.

B. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Concord Industries, Inc.
   2. Ewing Flagpoles.
   3. Pole-Tech Company Inc.

2.2 FLAGPOLES

A. Flagpole Construction, General: Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:

   1. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.
   2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.
   3. Provide self-aligning, snug-fitting joints.

B. Exposed Height: 25 feet above finish grade.

C. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, not less than 0.188-inch- nominal wall thickness. Provide with 3/16-inch steel bottom plate and support plate; 3/4-inch- diameter, steel ground spike; and steel centering wedges welded together. Galvanize steel after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole.

   1. Provide flashing collar of same material and finish as flagpole.
   2. Galv. corrugated steel ground sleeve w/ grounding spike.

2.3 FITTINGS

A. Finial Ball: Manufacturer's standard flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.

   1. 0.063-inch spun gold anodized aluminum.

B. Internal Halyard, Winch System (IWW): Manually operated winch with control stop device and removable handle, stainless-steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Provide flush access door secured with cylinder lock. Finish truck assembly to match flagpole; Beaded sling assembly. Revolving truck assembly with stainless steel bearings.

1. Halyard Flag Snaps: Provide two stainless-steel swivel snap hooks per halyard.

    a. Provide with neoprene or vinyl covers.

2. Provide one removable winch handle for each flagpole for use on either flagpole.

3. Keys to master keyed to building standard, provide 2 sets of keys for each flagpole.

2.4 MISCELLANEOUS MATERIALS

A. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.

B. Sand: ASTM C 33, fine aggregate.

C. Elastomeric Joint Sealant: Single-component neutral- and basic-curing silicone joint sealant complying with requirements in Division 07 Section "Joint Sealants" for Use NT (nontraffic) and for Use M, G, A, and, as applicable to joint substrates indicated, for Use O. Sealants shall be compatible with adjoining finishes and substrated.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, including foundation; accurate placement, pattern, orientation of anchor bolts, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.

B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.

C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concreting.

D. Place concrete, In accordance with foundation design Professional Engineer requirements and as specified in Division 3 Section "Cast-in-Place Concrete." Compact concrete in place by using vibrators. Moist-cure exposed concrete for not less than seven days or use nonstaining curing compound.

E. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.3 FLAGPOLE INSTALLATION

A. General: Install flagpoles where shown and according to Shop Drawings and manufacturer's written instructions.

B. Ground Set: Place foundation tube, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube and allow concrete to cure. Install flagpole, plumb, in foundation tube.

1. Foundation Tube: Place tube seated on bottom plate between steel centering wedges and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric joint sealant and cover with flashing collar.

C. Baseplate: Cast anchor bolts in concrete foundation. Install baseplate on washers placed over leveling nuts on anchor bolts and adjust until flagpole is plumb. After flagpole is plumb, tighten retaining nuts and fill space under baseplate solidly with nonshrink, nonmetallic grout. Finish exposed grout surfaces smooth and slope 45 degrees away from edges of baseplate. Top of flagpole shoe base shall be flush with adjoining pavers; provide weeps and method of drainage to drain away collected water within shoe base cavity.

END OF SECTION 10350

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SECTION 10426 - BUILDING SIGNAGE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Furnish all labor, materials, tools, equipment, etc. and services necessary and incidental to the complete fabrication, furnishing and erection of this Section as shown, noted, detailed and reasonably implied on the drawings and in the specifications.

B. The scope of work included in this Section is as follows:

1. Interior and Exterior Building Signs (Owner required and Code required).

1.3 RELATED SECTIONS

A. Coordinate work of this Section with of other Sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other Sections, including:

1. Division 15 – Mechanical & Plumbing. Equipment labeling.

2. Division 16 – Electrical. Illuminated exit signs and equipment labeling.

1.4 REFERENCES

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

i. American National Standards Institute (ANSI)
ii. American Society for Testing & Materials (ASTM)
iii. Federal Specifications
iv. Uniform Sign Code

1.5 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300 – Shop Drawings, Product Data and Samples.

B. Submit manufacturer's printed data describing products, model or series numbers, colors for selection, and finishes of all items in this Section.

1. Samples for Initial Selection: For each sign type and for each color and texture required, for each type of sign material indicated that involves color selection.

C. Submit shop drawings of all items, showing locations, sizes, quantities, methods of supporting, methods of anchoring, markings, finishes and operating hardware.

1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.

2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.

3. Provide signed and sealed engineered drawings for securement of the signs to the building exterior.

D. Submit samples of all signs for review, For each type of sign, include the following Samples to verify color selected:

1. Panel Signs: Full-size Samples of each type of sign required.

2. Approved samples will be returned for installation into Project.

E. Submit two (2) complete building signage schedules for review. After review, provide four (4) corrected copies of this schedule for distribution. No factory order shall be placed for materials until this review process has been completed.

F. Maintenance Data: For signage cleaning and maintenance requirements to include in maintenance manuals.

1.6 DELIVERY AND STORAGE

A. Deliver products to site under provisions of Section 01600 – Materials and Equipment.

B. All materials under this Section shall be delivered to the project site in their original unbroken containers bearing the manufacturer's name, brand and specification designation.

C. All materials shall be stored in a dry, protected area and above floor level.

1.7 COORDINATION

A. For signs supported by or anchored to permanent construction, advise installers of anchorage devices about specific requirements for placement of anchorage devices and similar items to be used for attaching signs.

1. For signs supported by or anchored to permanent construction, furnish templates for installation of anchorage devices and coordinate blocking requirements.

2. Field verify dimensions and conditions affecting sign installation.

1.8 CODES

A. All signage shall conform to the Department of Community Affairs, Florida Building Code Latest Edition in effect (FBC), Florida Accessibility Code for Building Construction, and local codes. Signage shall conform to ICC/ANSI A117.1, American National Standard for Accessible and Usable Buildings and Facilities.

1.9 WARRANTY

A. This manufacturer shall warranty against defects in materials and workmanship for a period of one (1) year from the date of substantial completion of the building.

B. Refer to Section - 01700 Project Closeout, Detail Requirements.

1.10 QUALITY ASSURANCE

A. All interior signage in this Section shall be fabricated by a single manufacturer with experience in providing work similar to that specified.

B. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1

C. The materials used shall have flammability and smoke values that meet the standards for flammability for interior materials.

D. Source Limitations: Obtain each sign type through one source from a single manufacturer.

PART 2 – PRODUCTS

2.1 BUILDING SIGNAGE

A. Building signage includes, but is not limited to: Code Required life safety signage and handicapped accessibility signage, room and/or room identification, Way finding/directional signage, and general informational signage.

2.2 SIGN TYPE - CODE REQUIRED & ROOM IDENTIFICATION SIGNAGE

A. Code required signage, products produced by 2/90 Sign Systms, PH (800) 777-4310, as the Project Basis of Design, shall be two toned acrylic plastic, embossed ADA, wall or door mounted, with tactile and braille graphics, or equal as approved by the Architect or Owner. The room identification signs shall match the graphics and colors of the room identification signs at selected and approved by the Owner.

1. Coordinate with the Owner and the Architect for mounting locations before anchorage to finished substrate. Refer to Florida Building Code, and Florida Accessibility Code for Building Construction.

2. Characters and background of all signs shall have eggshell, non-glare finish. Braille characters shall be same color as background.

3. Sign edges shall be smooth and free of saw marks and imperfections. The corners of the sign shall be square.

4. Mount signs with manufacturer's suggested permanent type mounting. Do not use double-sided vinyl tape.

5. The following manufacturers shall be considered as comparable products.

    a. Mohawk
    b. Andco Industries Corp.
    c. Best Manufacturing Co.
    d. The Super-sine Company
    e. ASI

G. Graphic Content and Style: Provide sign copy that complies with requirements for size, style, spacing, content, mounting height and location.

1. Type style shall be "OPTIMA," upper case, minimum 5/8 inch high. Lettering shall be computer generated, accurately reproducing the letter form.

2. All letters, numbers, and/or symbols shall contrast with the background, either light characters on a dark background or dark characters on a light background. Characters and background will have a non-glare finish.

3. Signage copy shall be accompanied by Grade 2 Braille. Braille shall be separated 12 mm (0.5-inch) from the corresponding raised character symbols. Grade 2 Braille translation to be provided by signage manufacturer.

4. Copy Position: As indicated on drawings, or where not indicated, centered/centered (cc) within the limits of the sign.

5. Text Height: As indicated on drawings or in signage schedule, or as follows:

    a. Lettering for room numbers shall be 25 mm (1-inch).
    b. Lettering for room ID signs shall be 16 mm (5/8-inch) or as noted.
    c. Lettering height for way finding signage shall be as per the Drawings.

6. Where graphic pictograms are indicated, symbol size shall be nominal 100 mm (4-inch) diameter.

H. Changeable Message Inserts: Provide changeable signs at all meeting rooms. Fabricate signs to allow insertion of changeable messages in the form of “IN-USE” slide-in inserts.

I. Tactile and Braille Sign: Manufacturer’s standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.

1. Panel Material: Opaque acrylic sheet or Photopolymer.

2. Raised-Copy Thickness: Not less than 0.8 mm (1/32 inch).

J. Laminated Interior Signs: Solid phenolic panel core with graphic image covered with thermosetting resin face layer.

1. Surface Finish: Mat.

2. Edge Condition: Manufactured standard.

3. Corner Condition: small radius.

4. Thickness: 3 mm (1/8 inch).

2.3 ACCESSORIES

A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

B. Fasteners anchored o aluminum substances or framing shall be stainless steel.

2.4 FINISHES, GENERAL

A. Protect mechanical finishes on exposed surfaces from damage by applying strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within range of approved Samples and are assembled or installed to minimize contrast.

2.5 ACRYLIC SHEET FINISHES

A. Colored Coatings for Acrylic Sheet: For copy and background colors, provide colored coatings, including inks, dyes, and paints, that are recommended by

acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for five years for application intended.

2.7 PIN MOUNTED SIGNAGE

A. Stainless Steel 316, pin letters , min. 3/8 inch thick, pin mounted,; font as shown on the drawings; to match the Airport standard.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Verify that items, including anchor inserts, provided under other sections of Work are sized and located to accommodate signs.

C. Examine supporting members to ensure that surfaces are at the elevations indicated or that may be required to comply with Authorities Having Jurisdiction and are free from dirt and other deleterious matter.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. The Architect and Owner shall have final decision on the location of all items in this Section.

B. After erection, the General Contractor shall adequately protect exposed portions of signage from damage by stucco, lime, cement, or other harmful compounds.

C. Do not mount signage on face of doors.

3.3 INSPECTION

A. Inspect building areas prior to sign(s) installation. Do not install signs until surfaces are acceptable to installer.

B. Notify the Architect and Owner, in writing, if there are any questions as to suitability of sign(s), installation location(s), or surface(s).

C. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer’s written instructions.

1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.

2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 75 mm (3 inches) of sign without encountering protruding objects or standing within swing of door.

D. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.

1. Silicone-Adhesive Mounting: Attach signs to irregular, porous, or vinyl-covered surfaces.

2. Shim Plate Mounting: Provide 3-mm- (1/8-inch-) thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other mounting methods are not practicable. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach panel signs to plate using method specified above.

3. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.

3.4 SIGNAGE SCHEDULE

A. A Signage Schedule shall be provided by the signage contractor per Article 1.4 Submittals, of this Section.

3.5 EXECUTION

A. All items in this Section shall be installed by experienced skilled mechanics in the best workmanlike manner of the trade's best standard practice.

B. All items shall be installed true, level, plumb and in strict accordance with the manufacturer's printed instructions and approved submittals.

3.6 GENERAL SIGNAGE

A. Wall mounted signs shall be installed 60 inches above finished floor to centerline of sign, and generally on latch side of door. Location shall be such that a person may approach within 3 inches of sign without encountering protruding objects or standing within swing of door.

B. Signs shall not be installed on the door.

3.7 CLEANING

A. The General Contractor shall be responsible for removal of protective materials and cleaning as recommended by manufacturer. The General Contractor shall be held responsible for damages resulting from the use of other cleaning materials.

3.8 MATERIAL AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and be replaced with new material in the best workmanlike manner at no extra cost to the Owner.

END OF SECTION 10426

SECTION 10507 – SOLID PLASTIC LOCKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Lockers with doors, frames, sides, tops, bottoms, backs, and shelves made from high impact, high density, polyethylene (HDPE) formed under high pressure into solid plastic components with homogeneous color throughout. The doors will be furnished in an accent color to be selected by the Architect and Owner from manufacturer's full range of colors.

1.3 PERFORMANCE REQUIREMENTS

A. Fire Resistance: Partition materials shall comply with the following requirements, when tested in accordance with the ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials:

1. Smoke Development Index: Not to exceed 450.
2. Flame Spread Index: Not to exceed 75.
3. Material Fire Ratings:

a. National Fire Protection Association (NFPA): Class B.
b. International Code Council (ICC): Class B.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, finishes for solid plastic lockers, and complete instructions.

B. Shop Drawings: For solid plastic lockers. Include plans, elevations, sections, details, and attachments to other work.

1. Show individual locker construction and overall dimensions.
2. Show details full size.

3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in solid plastic lockers.
5. Show solid plastic locker fillers, trim, base, sloping tops, and accessories.
6. Show solid plastic locker numbering sequence.

C. Samples for Initial Selection: For manufacturer's full range of solid plastic colors and finishes.

D. Samples for Verification: For the following:

1. Solid plastic panels, not less than 8 by 10 inches, for each type, color, pattern, and surface finish.
2. Exposed cabinet hardware and accessories, one unit for each type and finish.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For adjusting, repairing, and replacing solid plastic locker doors and latching mechanisms to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A company regularly engaged in manufacture of products specified in this Section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.

B. Installer Qualifications: A company or individual, regularly engaged in installation of products specified in this Section, with a minimum of 5 years experience.

C. Source Limitations: Obtain solid plastic lockers and accessories from single source from single manufacturer.

D. Regulatory Requirements: Where solid plastic lockers are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and FBC (latest edition adopted) Accessibility Guidelines for Buildings and Facilities."]

E. Contractor to coordinate and verify dimensions for built-in components / lockers.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver solid plastic lockers until painting and similar operations that could damage solid plastic lockers have been completed in installation areas. If solid plastic lockers must be stored in other-than-installation areas, store only in areas where environmental conditions are same as that in final installation location and comply with requirements specified in "Project Conditions" Article.

B. Locker components shall be stored flat until assembly. All finishes shall be protected from soiling and damage during handling.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install solid plastic lockers until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature between 60 and 90 deg F and humidity conditions at occupancy levels during the remainder of the construction period, or as required to prevent deformation or warping of the materials in accordance with the manufacturer’s requirements.

B. Field Measurements: Verify actual dimensions of concealed framing, blocking, and reinforcements that support wood lockers by field measurements before fabrication.

1.10 COORDINATION

A. Coordinate sizes and locations of concealed solid plastic support bases.

1. Requirements are specified in Division 6 Section "Miscellaneous Carpentry."

B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that solid plastic lockers can be supported and installed as indicated.

1.11 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of solid plastic lockers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures.
b. Faulty operation of locks or hardware.
c. Breakage, corrosion, and delamination of plastic under normal conditions.
d. Deterioration of other materials beyond normal use.

2. Warranty Period: Three years from date of Substantial Completion for all failures; Fifteen years from date of Substantial Completion for breakage, corrosion, and delamination of plastic.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Scranton Products; Tufftec Lockers or comparable product by one of the following:

1. ASI Storage Solutions, Inc.
2. General Partitions Mfg. Corp.
3. The Bradley Corporation.

2.2 MATERIALS

A. High Density Polyethylene (HDPE): Formed under high pressure into solid plastic components with homogeneous color throughout.

1. All solid plastic components shall resist deterioration and discoloration, when subjected to any of the following: acetic acid 80%, acetone, ammonia 12%, ammonium phosphate, bleach 12%, borax, brine, caustic soda, chlorine water, citric acid, copper chloride, core oils, hydrochloric acid 40%, hydrogen peroxide 30%, isopropyl alcohol, lactic acid 25%, lime sulfur, nicotine, potassium bromide soaps, sodium bicarbonate, trisodium phosphate, urea, urine and vinegar.

2. Testing in accordance with corrosion testing procedure established by the Unites States Plastic Corporation.

3. All HDPE components shall have a smooth “orange peel” finish. Locker doors and frames shall be two-tone color.

4. Color: As selected by Architect from manufacturer's full range.

a. Doors will be blue, or from manufacturer’s full range of colors as selected by Architect and Owner.
b. Frames and interior will be grey or from manufacturer’s full range of colors, as selected by Architect and Owner.

B. Adhesives: Adhesives shall not contain urea formaldehyde.

C. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

D. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.

1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as indicated on Drawings.
2. Provide toothed-steel or lead-expansion sleeves for drilled-in-place anchors.

E. Support Base: Manufacturer's standard.

2.3 SOLID PLASTIC LOCKER HARDWARE

A. General: Provide manufacturer's standard solid plastic locker hardware complying with the requirements in this Section. Lockers shall be capable of being locked with Owner furnished pad locks.

B. Continuous Hinges: Heavy duty extruded aluminum with powder coating to match the locker door and frame

1. Door hinge shall be full length assembled onto the door and front.

C. Exposed Hardware Finishes: Manufacturer’s standard.

2.4 CONTINUOUS LATCH

A. General: HDPE plastic latch capable of accepting pad lock.

1. Latch shall be securely fastened to the entire length of the door.

2. Pad locks shall be furnished by Owner.

2.5 SOLID PLASTIC LOCKERS

A. Doors and frames shall be made from HDPE into solid plastic components 1/2” thick.

1. 12”w x 18” d, with lattice mesh louvers.
2. Double tier with lattice mesh louvers, as illustrated in the Drawings, as required for accessibility, with ADA engraved logo.

B. Sides, tops, bottoms, backs, and shelves shall be made from HDPE into solid plastic components 3/8” thick.

1. Components shall have machined edges to accept assembly brackets.

C. Assembly profile shall be full depth, width and height of the lockers. Profiles shall be made from PVC plastic and snapfit assemble onto locker outsides, insides, backs, tops and bottoms.

2.6 LOCKER ACCESSORIES

A. Coat Hooks: Manufacturer's standard, high impact plastic.

1. Provide two-prong hook mounted to bottom of the shelf or divider, one each per door opening.

B. Number Plates: 1-1/2-inch- (38-mm-) diameter, etched, embossed, or stamped, stainless-steel plates with black numbers and letters at least 1/2 inch (13 mm) high. Identify lockers in sequence indicated on Drawings, or as approved by the Architect.

2.7 FABRICATION

A. Fabricate each solid plastic locker with shelves, an individual door and frame, an individual top, a bottom, and a back, and with common intermediate uprights separating compartments.

1. Fabricate solid plastic lockers to dimensions, profiles, and details indicated.
2. Lockers shall be manufactured for assembly in a group of no more than four adjacent lockers.
3. Provide sloped tops at lockers where no soffit is provided and the tops all exposed below the milling.

B. Fabricate components square, rigid, without warp, and with finished faces flat and free of scratches and chips. Accurately machine components for attachments in factory. Make joints tight and true.

1. Solid plastic components shall snap or mechanically fastened together for easy assembly and shall provide a solid and secure construction.

C. Fabricate steel tube frame and plywood decking support bases as required for lockers to be supported from the locker bench frame.

D. The ADA symbol shall be engraved on the lower door of one of the pair of double tier lockers for the ADA accessible locker.

E. Accessible Lockers: Fabricate as follows:

1. Locate bottom shelf no lower than 15 inches above the floor.
2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.

F. Venting: Fabricate lockers with space between doors and locker assembly of not less than **1/4 inch**.

G. Number Plates: Surface mounted or inlay number plates at each locker door, near top, centered.

H. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

I. Shop cut openings, to maximum extent possible, to receive hardware, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand or polish edges of cutouts to remove splinters and burrs.

J. Manufacturer's standard trim or filler panel at abutting wall conditions, to match locker face.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting wood locker installation.

B. Verify that furring is attached to masonry walls that are to receive wood lockers.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Condition solid plastic lockers to average prevailing humidity conditions in installation areas before installation.

B. Before installing solid plastic lockers, examine factory-fabricated work for completeness and complete work as required, including removal of packing.

3.3 INSTALLATION

A. Install support base.

B. Install solid plastic lockers level, plumb, and true; use concealed shims.

C. Connect groups of solid plastic lockers together with manufacturer's standard fasteners, through predrilled holes, with no exposed fasteners on face frames. Fit solid plastic lockers accurately together to form flush, tight, hairline joints.

D. Install solid plastic lockers at the location shown in accordance with the manufacturer's instructions for plumb, level, rigid and flush installation.

E. Install solid plastic lockers without distortion so doors fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings, providing unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Installation Tolerance: No more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line. Shim as required with concealed shims.
2. Fasten solid plastic lockers through back, near top and bottom, at ends with manufacturer's standard fasteners and in accordance with manufacturer's instructions for penetration into substrate provided.

F. Scribe and cut corner and filler panels to fit adjoining work using fasteners concealed where practical. Repair damaged finish at cuts.

G. Install number plates after solid plastic lockers are in place.

1. Attach number plate on each solid plastic locker door, near top, centered, with at least two screws with finish matching number plate.

3.4 ADJUSTING, CLEANING, AND PROTECTING

A. Clean, lubricate, and adjust hardware. Adjust doors to operate easily without binding.

B. Protect solid plastic lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.

C. Touch up marred finishes, or replace solid plastic lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by wood locker manufacturer.

END OF SECTION 10507

SECTION 10520 – FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Portable fire extinguishers and mounting brackets for wall-hung fire extinguishers.

2. Fire-protection cabinets for the following:

a. Portable fire extinguishers.

3. Portable Fire Extinguishers.

4. Portable Fire Extinguishers Mounting Brackets.

5. AED Equipment Cabinet.

1.3 SUBMITIALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.

1. Fire Extinguishers: Include rating and classification.
2. Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

B. Operation and Maintenance Data: For fire extinguishers and cabinets to include in maintenance manuals.

C. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain fire extinguishers and cabinets through one source from a single manufacturer.

B. Size Limitations: Provide fire-protection cabinets having dimensions that match or are less than the width, depth and projection from wall dimensions of the specified cabinets.

C. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."

D. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

E. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements of ASTM E 814 for fire-resistance rating of walls where they are installed.

1.5 COORDINATION

A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and location of fire-protection cabinets with wall depths.

1.6 SEQUENCING

A. Apply labels/lettering on field-painted fire-protection cabinets after painting is complete.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure of hydrostatic test according to NFPA 10.
b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CABINET MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:

1. Sheet: ASTM B 209.
2. Extruded Shapes: ASTM B 221.

C. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.2 MANUFACTURERS

A. Basis of Design: J. L. Industries model # C1027V10 or # FX C1027V10 (rated walls) semi recessed, powder coated-painted steel 1 and ½" radiused trim (white), contemporary vertical duo – door style, with clear tempered glass, and Futura Embossed "Fire" Handle – Mill finish, with aluminum tub and integral lock, or approved equal by Architect. Furnish and install tamper resistant break away cables.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. J.L. Industries, Inc.
2. Larsen's Manufacturing Company.
3. Potter-Roemer; Div. of Smith Industries, Inc.

2.3 ACCESSORIES

A. Mounting Brackets: Manufacturer's standard steel, designed to secure extinguisher, of sizes required for types and capacities of extinguishers indicated, with plated or black baked-enamel finish.

1. Provide brackets for extinguishers not located in cabinets.
2. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.
3. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
4. Door Lock: Cylinder Lock, keyed alike to other cabinets and facility standard.
5. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
    a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISERS".
        i. Location: Applied to cabinet door.
        ii. Application Process: Silk-screened.
        iii. Lettering Color: Red.
        iv. Orientation: Vertical.

2.4 CABINET FABRICATION

A. Non-rated Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.

B. Rated Fire Protection Cabinets (where mounted in rated walls): Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.0428-inch thick, cold-rolled steel sheet lined with minimum 5/8 inch thick,

fire-barrier material. Provide factory-drilled mounting holes.
2. Provide with rating to match wall rating within which cabinet is to be installed.

C. Cabinet Doors: Fabricate doors according to manufacturer's standards, from material indicated and coordinated with cabinet types and trim styles selected.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
2. Miter and weld perimeter door frames.
3. Continuous hinge.

D. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 STEEL FINISHES

A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No.1, "White Metal Blast Cleaning" or SSPCSP 8, "Pickling". After cleaning, apply a conversion coating suited to the organic coating to be applied over it.

B. Factory Prime chromate-free, pretreatment. Finish: Apply manufacturer's standard, fast-curing, lead- and universal primer immediately after surface preparation and

C. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
1. Color and Gloss: Matte white.

2.7 AED CABINET

1. AED equipment and AED training provided by Owner.

2. Cabinet Type Basis of Design: JL Industries or Architect approved equal: Semi-recessed with 2 ½” rolled edge, powder coated aluminum - (white) – Model No. 1427F12.

2.8 PORTABLE FIRE EXTINGUISHERS

A. Manufacturers:

1. General Fire Extinguisher Corporation.
2. JL Industries, Inc.
3. Larsen's Manufacturing Company.
4. Potter Roemer; Div. of Smith Industries, Inc.

B. General: Provide fire extinguishers of type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.

1. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix b and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.

C. Regular Dry-Chemical Type in Steel Container: UL-rated, 10 B:C, 5-lb nominal capacity, with sodium bicarbonate-based dry chemical in enameled-steel container. Provide with recessed cabinets at locations shown on the drawings

D. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:60-B:C, 10-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container. Provide (3) with bracket mounts to be used at non-public spaces such as mechanical equipment rooms.

2.9 MOUNTING BRACKETS

A. Manufacturers:

1. Amerex Corporation.
2. Ansul Incorporated.
3. Badger Fire Protection.
4. Buckeye Fire Equipment Company.
5. Fire End & Croker Corporation.
6. General Fire Extinguisher Corporation.
7. JL Industries, Inc.
8. Larsen's Manufacturing Company.
9. Potter Roemer; Division of Smith Industries, Inc.

B. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
1. Color: Black.

C. Identification: Lettering complying with authorizes having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
a. Orientation: Vertical

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for hose valves and cabinets to verify actual locations of piping connections before cabinet installation.

B. Examine walls and partitions for suitable framing depth and blocking where recessed cabinets are to be installed.

1. Rated Partitions and Barriers: Examine to confirm construction meets rating requirements and is routed continuously "floor to ceiling." Notify Architect if partition/barrier rating will be compromised by cabinet installation.

C. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged units.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for recessed fire protection cabinets as required by type and size of cabinet and trim style. Coordinate and verify depth of recess required during framing and rough in of walls.

3.3 INSTALLATION

A. General: Install fire protection cabinets and fire extinguishers in locations.

1. Comply with ADA Guidelines' "reach range" dimensions for maximum mounting heights of cabinets, extinguishers, and other emergency equipment.

2. Coordinate door handle height and cabinet mounting height where cabinets are mounted with non standard manufacture heights.

B. Fire Protection Cabinets: Fasten cabinets to structure and framing, square and plumb provide required blocking to support cabinet and fire extinguisher.

1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is not adequate for recessed, provide semi-recessed fire-protection cabinets.

2. Provide inside latch and lock for break-glass panels.

3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

C. Identification: Apply labels/lettering at locations indicated.

D. Examine walls and partitions for suitable framing depth and blocking where

recessed cabinets will be installed.

E. Install fire-protection specialties in locations and at mounting heights indicated or, if not indicated, at heights acceptable to Authorities Having Jurisdiction.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturers written installation instructions.

B. Adjust fire protection cabinet doors to operate easily without binding.

C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.

E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10520

SECTION 10712 – FIBERGLASS SHUTTERS

PART 1 -- GENERAL

1.1 RELATED WORK

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Functional exterior shutters.
2. Exterior shutter hardware.

1.3 RELATED SECTIONS

A. Section 09900 – Paints and Coatings.

1.4 REFERENCES

A. ASTM E 330 – Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
B. ASTM E 1886 – Standard Test method for performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Missiles and Exposed to Cyclic Pressure Differentials.
C. ASTM E 1996 – Standard Specification ofr Performance of Exterior Windows, Curtain Walls, Doors and Strom Shutters Impacted by Windborne Debris in Hurricanes.

1.5 ACTION SUBMITTALS

A. Submit items per the provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Show materials, layout, dimensions, profiles, fasteners and anchors, hardware, finishes, and interface with adjacent construction.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's 40 standard colors.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and textures.

F. Florida Product Approval- NOA or engineered submittal showing compliance with wind speed requirements.

1.6 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.8 QUALITY ASSURANCE

A. Storm Rated Hurricane Shutters: The completed shutter assembly conforms to:
1. ASTM E 330 for Static Air Pressure.
2. ASTM E 1886 and ASTM E 1996 for large missile impact and cyclic pressure loading.

B. Thermal Stability: Fiberglass louvers and side rails thermally stable from minus 100 degrees F (minus 38 C) to 200 degrees F (93 C).

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer's original, unopened packaging, with labels clearly identifying product name and manufacturer.

B. Store products in manufacturer’s unopened packaging until ready for installation.

C. Store materials in a clean, cool and dry area in accordance with manufacturer’s instructions. Do not leave unopened shutters in direct sunlight.

D. Protect materials during handling and installation to prevent damage.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

A. Provide with a limited lifetime warranty on structural components and manufacturers defects and factory applied finish. Warranty is limited to the original purchaser.

B. Provide a limited ten year warranty on structural components and factory applied paint finish.

PART 2 -- PRODUCTS

2.1 MANUFACTURED UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Atlantic Premium Shutters – The Tapco Group
   29797 Beck Rd.
   Wixom, MI 48398-2834
   Tel: 866-288-2726
   Wayne_Sanderson@tapcoint.com

2.2 Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.1 SHUTTERS

A. Bahama Shutters: Atlantic Architectural Collection Bahama Shutters fabricated of pultruded fiberglass for vertical stiles, horizontal rails and horizontal louvers. Finished shutter is 1--1/4 inch (32 mm) thick. Shutters are finished with two part urethane paint, oven cured.
   1. Style:
      a. Additional rails
      b. Standard with Additional vertical mullion
   2. Width:
      a. Double panel with vertical mullion, full width of the window
   3. Height:
      a. As indicated on the Drawings
   4. Colors:
      a. Custom color as selected by Architect

B. Atlantic Architectural Collection Bahama Shutter Hardware only.
   1. Hardware:
      a. Male Hinge:
         1) Plate size -- 1--1/8 inch (28 mm) backplate.
      b. Female Hinge, 3--3/8 inch (86 mm):
         1) Plate size 1--1/4 inch (32 mm) with 1/4 inch (6 mm) lip.
         2) Projection 3--3/8 inch (86 mm).
      c. Tilt Arms:
         1) Black Anodized tilt arms with nylon end caps.
         2) Nylon hinges/eye end sets.

3) Stainless steel clevis pin.

e. Locking bar and mounting brackets.

PART 3 -- EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Commencement of work will imply acceptance of substrate.

3.2 EXAMINATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer’s instructions and with no fasteners through the face of the shutters.

B. Adjust operable units for smooth unobstructed operation.

3.4 PROTECTION

A. Protect installed products from damage by weather and other work until Date of Substantial Completion.

B. Touch-up and repair damaged products before Date of Substantial Completion.

END OF SECTION 16425

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SECTION 10155 - TOILET PARTITIONS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Overhead Braced and Floor Mounted Toilet Partitions and wall hung Urinary Screens in locations indicated on the Drawings.

B. Related Sections include, but are not limited to:

1. Section 05500 - Miscellaneous Metals
2. Section 06100 - Rough Carpentry.
3. Section 09310 - Ceramic Tile

1.3 REGULATORY REQUIREMENTS

A. Conform to State of Florida Accessibility Code for Building, Latest Edition in effect (or Chapter 11 of Florida Building Code, Latest Edition in effect) for installing work in conformance with ANSI A 117.1.

1.4 SUBMITTALS

A. Product Data: Provide data on toilet partition and urinary screen materials, including catalog cuts of anchors, hardware, fastenings, and accessories.

B. Shop Drawings: Indicate partition plan and elevation views, dimensions, and details of wall supports.

C. Samples: Submit two samples 12 x 12-inches in size illustrating panel finish, color, and sheen.

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide phenolic partitions that comply with the following requirements:

1. Fire-Resistance Characteristics: Where indicated, provide toilet partitions identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities

having jurisdiction.

B. Surface-Burning Characteristics: Provide phenolic partitions with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products when tested per ASTM E 84:

1. Smoke-Developed Index: 70 or less for 3/4-inch thick and 85 or less for ½-inch material.

C. Stainless steel hardware shall comply with ASTM A 167, Type 304.

D. Concealed fasteners and leveling devices: galvanized steel; ASTM A 153.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pre-finished materials to the project site in original, unopened cartons or packaging materials necessary to protect structure and finishes. Label packages clearly with manufacturer’s name and item description.

B. Store compartment components in a vertical position with adequate support to ensure flatness and to prevent damage to pre-finished surface.

1.7 JOB CONDITIONS

A. Field Measurements: Verify actual locations of walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 COORDINATION

A. Furnish inserts and anchorages that must be built into other work for installation of toilet compartments and related items; coordinate delivery with other work to avoid delay.

1.9 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents, including but not limited to the Owner’s warranty requirements of the Div. 0 and Div. 1 specification requirements.

B. Submit written agreement on toilet partition manufacturer's standard form, signed by manufacturer, installer, and contractor, agreeing to repair or replace defective parts including, but not limited to doors, panels, and hardware, that do not comply

with referenced quality standards and plastic laminated materials that discolor or delaminate from the partition core.

1. Warranty Period: three years from date of Substantial Completion and Owner Final Acceptance.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Materials are specified by brand names to establish a basis for quality and design, or by performance requirements and general description of product. The Interior Designer or Architect will consider substitutions for brand names of products specified, provided the procedures set forth for substitutions are followed and the substitutions are equal or better than the approved products. The Architect reserves the right to reject any material which, in the Interior Designer's opinion, will not produce the quality of the work specified herein.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Ampco Products Inc. (305) 821-5700 www.ampco.com
2. Bobrick Washroom Equipment (800) 553-1600 www.bobrick.com
3. General Partitions Mfg. (814) 833-1154 www.genpartitions.com

C. One substitute manufacturer may be submitted for each product specified in this section, to Architect for review following procedures established in Section 01631 and upon receipt of completed Substitution Form.

2.2 PRODUCTS

A. Panel Construction: High pressure through color scratch resistant plastic laminate, NEMA LD 3, GP-50, 0.050-inch nominal thickness, color and pattern as selected by Architect; core of 1" thick, APA-Marine-Grade Plywood (exterior grade) with fully waterproof structural adhesive. Pilaster Shoes: ASTM A 167, Type 302/304 stainless steel, not less than 3" high, 20 gage, finished to match hardware.

B. Doors and Panels: 1 inch thick, face pressure bonded to core.

C. Partition Mounting & Style: Standard Overhead Braced and Floor Mounted.

1. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with anti-grip profile and in manufacturer's standard finish.

D. Screen Mounting & Style: Continuous – Stainless Steel "C" Channel Wall-Hung.

1. Support Brackets for Urinal Screens: Manufacturer's standard continuous stainless steel "C" channel bracket.

E. Brackets (Fittings):

1. Stirrup Type: Ear or U-brackets, ASTM A 167, Type 302/304 stainless steel, not less than 3" high, 20 gage, finished to match hardware.

F. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.

G. Hardware: Manufacturer's standard design, heavy-duty operating hardware and accessories of stainless steel.

1. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees and return to pre-set position when not locked. Hinge shall allow emergency access by lifting the door from the bottom.
2. Latch and Keeper: Manufacturer's standard recessed latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be accessible to people with disabilities.

3. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.

4. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.

5. Door Pull: Manufacturer's heavy duty-latch-type unit at out-swinging doors that complies with accessibility requirements of authorities having jurisdiction. Provide units on both sides of doors at compartments indicated to be accessible to people with disabilities.

2.3 FABRICATION

A. Fabricate components with plastic laminate finish to faces and edges of core material. Apply laminate to edges before broad surfaces to seal edges and prevent laminate from being pried loose. Seal exposed core material at cutouts to protect core from moisture.

B. Doors: Unless otherwise indicated, provide 24-inch-wide in-swinging doors for

standard toilet compartments and 36-inch-wide out-swinging doors with a minimum 32-inch-wide clear opening for compartments indicated to be accessible to people with disabilities unless noted otherwise on the drawings.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Verify that opening dimensions and plumbing fixture and rough-in locations are as indicated on shop drawings and have been verified in the field.

3.2 INSTALLATION

A. Install partition components secure, plumb, and level in accordance with manufacturer's instructions.

B. Attached panel brackets securely using anchor devices; anchors for urinal screens shall be set to ensure lateral loads are accommodated.

C. Provide adjustment for height variations with threaded rods through steel saddles. Conceal fastenings with pilaster shoes.

D. Equip each door with three hinges, one door latch, and one coat hook and bumper.

E. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and doors in entrance screens to return doors to fully closed position.

END OF SECTION 10155

SECTION 10520 – FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Portable fire extinguishers and mounting brackets for wall-hung fire extinguishers.

2. Fire-protection cabinets for the following:

a. Portable fire extinguishers.

3. Portable Fire Extinguishers.

4. Portable Fire Extinguishers Mounting Brackets.

5. AED Equipment Cabinet.

1.3 SUBMITIALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.

1. Fire Extinguishers: Include rating and classification.
2. Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

B. Operation and Maintenance Data: For fire extinguishers and cabinets to include in maintenance manuals.

C. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain fire extinguishers and cabinets through one source from a single manufacturer.

B. Size Limitations: Provide fire-protection cabinets having dimensions that match or are less than the width, depth and projection from wall dimensions of the specified cabinets.

C. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."

D. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

E. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements of ASTM E 814 for fire-resistance rating of walls where they are installed.

1.5 COORDINATION

A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and location of fire-protection cabinets with wall depths.

1.6 SEQUENCING

A. Apply labels/lettering on field-painted fire-protection cabinets after painting is complete.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure of hydrostatic test according to NFPA 10.
b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CABINET MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:

1. Sheet: ASTM B 209.
2. Extruded Shapes: ASTM B 221.

C. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.2 MANUFACTURERS

A. Basis of Design: J. L. Industries model # C1027V10 or # FX C1027V10 (rated walls) semi recessed, powder coated-painted steel 1 and ½” radiused trim (white), contemporary vertical duo – door style, with clear tempered glass, and Futura

Embossed “Fire” Handle – Mill finish, with aluminum tub and integral lock, or approved equal by Architect. Furnish and install tamper resistant break away cables.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. J.L. Industries, Inc.
2. Larsen's Manufacturing Company.
3. Potter-Roemer; Div. of Smith Industries, Inc.

2.3 ACCESSORIES

A. Mounting Brackets: Manufacturer's standard steel, designed to secure extinguisher, of sizes required for types and capacities of extinguishers indicated, with plated or black baked-enamel finish.

1. Provide brackets for extinguishers not located in cabinets.
2. Break-Glass Strike: Manufacturer’s standard metal strike, complete with chain and mounting clip, secured to cabinet.
3. Lettered Door Handle: One-piece, cast-iron door handle with the word “FIRE” embossed into face.
4. Door Lock: Cylinder Lock, keyed alike to other cabinets and facility standard.
5. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
    a. Identify fire extinguisher in fire-protection cabinet with the words “FIRE EXTINGUISERS”.
        i. Location: Applied to cabinet door.
        ii. Application Process: Silk-screened.
        iii. Lettering Color: Red.
        iv. Orientation: Vertical.

2.4 CABINET FABRICATION

A. Non-rated Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.

B. Rated Fire Protection Cabinets (where mounted in rated walls): Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.0428-inch thick, cold-rolled steel sheet lined with minimum 5/8 inch thick, fire-barrier material. Provide factory-drilled mounting holes.
2. Provide with rating to match wall rating within which cabinet is to be installed.

C. Cabinet Doors: Fabricate doors according to manufacturer's standards, from material indicated and coordinated with cabinet types and trim styles selected.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
2. Miter and weld perimeter door frames.
3. Continuous hinge.

D. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 STEEL FINISHES

A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No.1, "White Metal Blast Cleaning" or SSPCSP 8, "Pickling". After cleaning, apply a conversion coating suited to the organic coating to be applied over it.

B. Factory Prime chromate-free, pretreatment. Finish: Apply manufacturer's standard, fast-curing, lead- and universal primer immediately after surface preparation and

C. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
1. Color and Gloss: Matte white.

2.7 AED CABINET

1. AED equipment and AED training provided by Owner.

2. Cabinet Type Basis of Design: JL Industries or Architect approved equal: Semi-recessed with 2 ½” rolled edge, powder coated aluminum - (white) – Model No. 1427F12.

2.8 PORTABLE FIRE EXTINGUISHERS

A. Manufacturers:

1. General Fire Extinguisher Corporation.
2. JL Industries, Inc.
3. Larsen’s Manufacturing Company.
4. Potter Roemer; Div. of Smith Industries, Inc.

B. General: Provide fire extinguishers of type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.

1. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix b and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.

C. Regular Dry-Chemical Type in Steel Container: UL-rated, 10 B:C, 5-lb nominal capacity, with sodium bicarbonate-based dry chemical in enameled-steel container. Provide with recessed cabinets at locations shown on the drawings

D. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:60-B:C, 10-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container. Provide (2) with bracket mounts to be used at non-public spaces such as mechanical equipment rooms.

E. Electrical and Server room extinguishers: JL Industries Halotron or approved equal: UL-rated A:B:C, 10-lb nominal capacity. Provide with bracket mounts.

2.9 MOUNTING BRACKETS

A. Manufacturers:

1. Amerex Corporation.
2. Ansul Incorporated.
3. Badger Fire Protection.
4. Buckeye Fire Equipment Company.
5. Fire End & Croker Corporation.
6. General Fire Extinguisher Corporation.
7. JL Industries, Inc.
8. Larsen’s Manufacturing Company.
9. Potter Roemer; Division of Smith Industries, Inc.

B. Mounting Brackets: Manufacturer’s standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
1. Color: Black.

C. Identification: Lettering complying with authorizes having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words “FIRE EXTINGUISHER” in red letter decals applied to mounting surface.
a. Orientation: Vertical

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for hose valves and cabinets to verify actual locations of piping connections before cabinet installation.

B. Examine walls and partitions for suitable framing depth and blocking where recessed cabinets are to be installed.

1. Rated Partitions and Barriers: Examine to confirm construction meets rating requirements and is routed continuously "floor to ceiling." Notify Architect if partition/barrier rating will be compromised by cabinet installation.

C. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged units.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for recessed fire protection cabinets as required by type and size of cabinet and trim style. Coordinate and verify depth of recess required during framing and rough in of walls.

3.3 INSTALLATION

A. General: Install fire protection cabinets and fire extinguishers in locations.

1. Comply with ADA Guidelines' "reach range" dimensions for maximum mounting heights of cabinets, extinguishers, and other emergency equipment.

2. Coordinate door handle height and cabinet mounting height where cabinets are mounted with non standard manufacture heights.

B. Fire Protection Cabinets: Fasten cabinets to structure and framing, square and plumb provide required blocking to support cabinet and fire extinguisher.

1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is not adequate for recessed, provide semi-recessed fire-protection cabinets.

2. Provide inside latch and lock for break-glass panels.

3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

C. Identification: Apply labels/lettering at locations indicated.

D. Examine walls and partitions for suitable framing depth and blocking where recessed cabinets will be installed.

E. Install fire-protection specialties in locations and at mounting heights indicated or, if not indicated, at heights acceptable to Authorities Having Jurisdiction.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturers written installation instructions.

B. Adjust fire protection cabinet doors to operate easily without binding.

C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.

E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10520

SECTION 10801 – TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Toilet and bath accessories.
2. Childcare accessories.
3. Under lavatory guards.
4. Custodial accessories.

B. Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.

C. Related Sections:

1. Division 5 Section “Metal Fabrications” for corner guards.
2. Division 6 Section “Miscellaneous Carpentry” for wood blocking.
3. Division 8 Section “Mirrors” for frameless mirrors.
4. Division 9 Section "Ceramic Tile" for ceramic toilet and bath accessories.
5. Division 10 Section "Toilet Compartments" for plastic laminate units.
6. Division 16 Section “Interior Lighting” for lighting and electrical drawings at backlit mirrors.

1.3 QUALITY ASSURANCE

A. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet and Bath Accessory Schedule.

1. Products of other manufacturers listed in Part 2 with equal characteristics, as judged by Architect and Owner, may be provided.
2. Do not modify aesthetic effects, as judged by Architect and Owner. Where modifications are proposed, submit comprehensive explanatory data to Architect and Owner for review.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include operating characteristics, dimensions of individual toilet and bath accessory, and finishes for each toilet and bath accessory.

B. Toilet and Bath Accessory Schedule: For toilet and bath accessories; use same designations indicated on Drawings or Schedule as specified.

C. Maintenance Data: For each product to include in maintenance manuals.

D. Warranties: Special warranties specified in this Section.

1.5 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

C. Field verify depths of wall cavities, mounting heights, blocking requirements, locations do not interfere with door swings or use of accessory, etc. for all accessories.

1.6 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Manufacturer's Mirror Warranty: Written warranty, executed by mirror manufacturer agreeing to replace mirrors that develop visible silver spoilage defects within minimum warranty period indicated.

1. Minimum Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide accessories by one of the following:

1. Toilet, Bath, and Custodial Accessories:

a. Basis-of-Design shall be Bobrick Washroom Equipment, Inc.
b. The following manufacturers shall be acceptable provided products meet or exceed the specified or scheduled accessories; and are approved by the Architect and Owner:

1) American Specialties, Inc.
2) Bradley Corporation.

3) GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.

2. Childcare Accessories:

a. Basis-of-Design shall be Koala Kare Products; a division of Bobrick Washroom Equipment, Inc.
b. The following manufacturers shall be acceptable provided products meet or exceed the specified or scheduled accessories; and are approved by the Design Build Architect:

1) American Specialties, Inc.
2) Diaper Deck & Company, Inc.
3) GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.

3. Bench Seat:

a. Basis-of Design shall be INVISIA ADA fold down shower seat - Brushed nickel.

b. No substitutions

B. Products: Subject to compliance with requirements, provide products indicated for each designation in the Toilet and Childcare Accessory Schedule at the end of Part 3 or equal approved by the Architect and Owner.

2.2 MATERIALS

A. Metals

1. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch minimum nominal thickness, unless otherwise indicated.
2. Galvanized Steel Sheet: ASTM A 653/A 653M, G60

B. Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.

C. Accessories:

1. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
2. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.
3. Blocking: Fire retardant or galvanized metal blocking (12 GA) where scheduled or required to support accessory.

2.3 FABRICATION

A. General: One, maximum 1-1/2-inch diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.

B. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.

C. Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.

1. Provide galvanized steel backing sheet, not less than 0.034 inchand full mirror size, with non-absorptive filler material. Corrugated cardboard is not an acceptable filler material.

D. Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:

1. Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

E. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

F. Toilet Paper Spindles/Dispensers: All Toilet paper dispensers shall be provided with spindles to accommodate coreless toilet paper rolls; 1-inch minimum diameter. Confirm size of spindle with the Airport prior to ordering materials. Provide left hand or right-hand dispensers depending on toilet configuration and orientation. Through partition units only serving one toilet compartment or stall shall be provided with a solid door panel on the adjacent stall, where no dispenser is required.

G. Paper Towel Dispensers/Guides: Shall be provided with custom plastic guide inserts to prevent multiple paper towel dispensing at each use. The paper towel and mirror units shall be back lit and custom fabricated to match the design and as shown or scheduled.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated. Confirm clearances, wall depths, and blocking requirements prior to framing walls. Comply with FBC Accessibility mounting height and spacing requirements.

B. Furnish and install the left-hand toilet paper and toilet seat dispenser unit at left hand configured toilets and the right-hand unit at right hand configured toilets. Provide solid face doors at single-through wall-unit applications, where only one toilet compartment requires

a dispenser. The dispensers shall be flush with the partition at toilet stalls with grad bars. Ensure that the doors to service the units can open when installed and not in conflict with toilet fixtures.

C. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.

D. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446. Install shower seats to withstand a downward load of at least 360 Lbs.

E. Under lavatory Guards: Where this designation is indicated at all exposed plumbing pipe locations and/or where needed to prevent direct contact with and burn from piping, provide under lavatory guards complying with the following:

1. Manufacturers: Available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Plumberex Specialty Products, Inc.
   b. Truebro by IPS Corporation.

2. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
3. Material and Finish: Antimicrobial, molded plastic, white.
4. Refer to plumbing fixture schedule for sinks with ceramic or porcelain shrouds.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.3 TOILET AND BATH ACCESSORY SCHEDULE

A. **Back Lit Mirror:** (**A01)** provide A02 mirror unit (at all sinks) complying with the following:

1. Products: Available products include the following:

   a. Manufacturer: Bobrick Washroom Equipment, Inc./GAMCO
   b. Product: Backlit mirror with custom (mirror size 18” wide by 37” high) framed-hinged mirror, with custom integral “C” fold-paper towel dispenser and towel mate (262-130) paper dispenser guide.

B. **ADA Sink Mirror: (A02)**

1. Products: Available products to include the following:
   a. Manufacturer: Bobrick (B290 Series)
   b. Product: Surface mounted mirror (mirror size 18” wide by 46” high) framed mirror; align top and bottom with counter mirrors.
   c. Stainless Steel, Welded-frame Mirror: Fabricate frame from stainless-steel angles in manufacturer's standard satin finish with corners welded, edge ground and polished smooth.

C. **Full Height Mirror: (A03)**

1. Products: Available products include the following:
   a. Manufacturer: Bobrick, (B290 Series)
   b. Full height mirror (2’6” x 6’10”) as shown on the drawings, with stainless steel trim.
   c. Stainless Steel, Welded-frame Mirror: Fabricate frame from stainless-steel angles in manufacturer's standard satin finish with corners welded, edge ground and polished smooth.

D. **Sloan Soap Dispenser:** (**A04),** mount at ADA sink and counter sinks (typ).

1. Products: Available products include the following:
   a. Manufacturer: Sloan.
   b. Product: Sloan model SJS-1750.

E. **Countertop:** (**A05),** Solid surface countertop.

1. Products: Quartz Solid Surface Countertop.

F. **Through Counter Trim/ Waste Chute: (A06)**

1. Products: Quartz Solid Surface to match the Countertop.

G. **Robe Hook:** (**A07) (Double Hook)**:

1. Products: Available products include the following:
   a. Manufacturer: Jacknob
   b. Product: model 4290
2. Concealed fasteners; stainless steel

H. **Toilet Partition:** (**A08)**

1. Products: Plastic Laminate with marine grade plywood core, reference Toilet Compartment Specifications:

I. **ADA Toilet Partition Door Bumper: (A09)**

1. Products: Available products include the following:
   a. Manufacturer: Jacknob
   b. Product: Model 4151; stainless steel.
2. Mount at top and bottom of the door; (2) two per door.

J. **Coat Hook and Door Bumper:** (**A10)**, provide coat hook with bumper (at restroom toilet stalls and ADA accessible restrooms) complying with the following:

1. Products: Available products include the following:
   a. Manufacturer: Jacknob
   b. Product: Model 4003
2. Description: Surface-mounted stainless-steel hook and bumper to partition at all toilet stalls and ADA stall; do not mount to door.
3. Materials and Finish: Stainless steel with satin finish.

K. **Urinal Screen Bracket: (A011)**

1. Products: Available products include the following:
   a. Manufacturer: Jacknob
   b. Product: Model 2369; stainless steel
2. Full length of urinal screen; provide treated wood blackening concealed within the wall

L. **Grab Bars: (A12 – 36", A13 – 42" & A25 @ ADA Shower)** provide grab bar (at all accessible toilet stalls, showers, and restrooms) complying with FBC accessibility code and with the following:

1. Products: Available products include the following:
   a. Manufacturer: Bobrick
   b. Product: Model B-6806 Series (by bar length – 36 INCH and 42 INCH) Grab Bar. (A12 & A13)
   c. Toilet Compartment grab bars complying with FBC.
   d. Style and Length
      1) Provide 42" long horizontal and 36" long grab bars at ADA toilets
      2) Provide both horizontal and vertical bars in conformance with ANSI A117.1, 604.5.
      3) At ADA Showers provide horizontal "L" Shaped bars B-58616 (32" x 24") (A25); short leg at back of wall of transfer shower; provide vertical grab bar B5806 x 36" where required by code.
2. Stainless-Steel Nominal Thickness: Minimum .047244 inches.
3. Mounting: Concealed with manufacturer's standard flanges and anchors.
4. Gripping Surfaces: Manufacturer's standard slip-resistant texture.
5. Outside Diameter: 1-1/2 inches for heavy-duty applications.
6. Length: As indicated in Toilet Accessory Schedule on Drawings.
7. Blocking: Fire retardant wood or heavy ga (12 GA) galvanized steel.

M. **Toilet Paper and Seat Cover Dispenser:** (**A14)**, provide recessed dispenser (at wall locations) complying with the following:

1. Products: Available products include the following:
   a. Manufacturer: Bobrick
   b. Product: Model B-347/B-3574 Stainless Steel Toilet Seat Cover Dispenser. Provide napkin disposal for women's restroom.
2. Description: Partition Surface Mounting. Recessed Wall Mounted.
3. Minimum Capacity: 250.

4. Material and Finish: Stainless steel, No. 4 finish (satin).
5. Mounting height: 48” max AFF mounting height. ADA stalls require accessible clear floor area. Do not obstruct required grab bar clearances.
6. Description: Roll-in-reserve dispenser with a flush tumbler lockset.
7. Operation: Spindles (2) – heavy-duty, 1” diameter for coreless toilet paper one-piece, molded ABS. Theft-resistant. Retained in dispensing mechanism when door is locked.
8. Capacity: Unit holds two standard toilet tissue rolls up to 5-1/4” diameter.
9. Provide left- or right-handed unit based on orientation and mount to tissue paper holder close to toilet per FBC requirements.

N. **Toilet Paper and Seat Cover Dispenser: (A15)** Provide toilet partition mounted complying with the following:

1. Products: Available products include the following:
   a. Manufacturer: Bobrick
   b. Product: Model B-357/B-3571 Stainless Steel Toilet Seat Cover Dispenser. Provide napkin disposal for women’s restroom.
2. Description: Partition Surface Mounting. Recessed Wall Mounted.
3. Minimum Capacity: 250.
4. Material and Finish: Stainless steel, No. 4 finish (satin).
5. Mounting height: 48” max AFF mounting height. ADA stalls require accessible clear floor area. Do not obstruct required grab bar clearances.
6. Description: Roll-in-reserve dispenser with a flush tumbler lockset.
7. Operation: Spindles (2) – heavy-duty, 1” diameter for coreless toilet paper one-piece, molded ABS. Theft-resistant. Retained in dispensing mechanism when door is locked.
8. Capacity: Unit holds two standard toilet tissue rolls up to 5-1/4” diameter.
9. Provide left- or right-handed unit based on orientation and mount to tissue paper holder close to toilet per FBC requirements.
10. Provide back to back unites where possible, and single faced units when no framed walls are available.

O. **Diaper-Changing Station:** (**A16)** Provide diaper-changing station (Public ADA accessible toilets) complying with the following:

1. Products: Available products include the following:
   a. Manufacturer: Koala Kare Products; a division of Bobrick Washroom Equipment, Inc.
   b. Product: Model K110-SSRE Horizontal Recessed-Mounted Stainless-Steel Finish Baby Changing Station.

2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.
3. Mounting: Recessed mounted, flush with wall when closed.
4. Operation: By pneumatic shock-absorbing mechanism.
5. Material and Finish: Stainless steel, No. 4 finish (satin), exterior shell with rounded plastic corners; HDPE interior in manufacturer's standard color.
6. Liner Dispenser: Built in.
7. Comply with all ADA accessibility clearance and approach requirements.
8. Cover all mounting holes not used for installation

P. **Sanitary Napkin Vendor:** (**A17)** Provide sanitary napkin vendor (at all women's restrooms) complying with the following:

1. Products: Available products include the following:
   a. Manufacturer: Bobrick Washroom Equipment, Inc.
   b. Product: Model B47063 Fully Recessed Napkin/Tampon Vendor. ADA compliant with push button operation.
2. Mounting: Fully recessed.
3. Operation: 50 cents charge; to be confirmed with Owner
4. Exposed Material and Finish: Stainless steel, No. 4 finish (satin).
5. Lockset: Tumbler type with separate lock and key for coin box.
6. Refill: Top fill.

Q. **Combination Recessed Towel Dispenser / Waste Receptacle:** (**A018),** provide combination paper towel dispenser/waste receptacle complying with the following:

1. Products: Available products include the following:
   a. Manufacturer: Bobrick Washroom Equipment, Inc.
   b. Product: Model B-3940/367-60 (12 Gallon Bin) Recessed Paper Towel Dispenser and Waste Receptacle.
2. Mounting: Recessed.
3. Minimum Towel-Dispenser Capacity: 600 C-fold, 800 multifold, or 1100 single fold paper towels.
4. Minimum Waste-Receptacle Capacity: 12 gal.
5. Material and Finish: Stainless steel, No. 4 finish (satin).
6. Waste-Container: Removable, leakproof, rigid molded plastic.
7. Lockset: Tumbler type for towel-dispenser compartment and waste receptacle.

R. **Utility Shelf with Mop and Broom Holders:** (**A19),** provide utility shelf with mop and broom holder (at all janitor's closets with a mop sink) complying with the following:

1. Products: Available products include the following:
   a. Manufacturer: Bobrick Washroom Equipment, Inc.
   b. Product: Model B-224x36 Utility Shelf with Mop/Broom Holders and Rag Hooks.

2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
3. Length: 36 inches.
4. Hooks: Three.

S. **Chemical Dispenser:** (**A20)**

1. Provided by Owner's maintenance vendor.
2. Provide water hood-up to chemical dispenser
3. Mount over mop sink

T. **Corner Guard: (A21)**

1. Products: Refer to metal fabrications for additional information
2. Full height (U.N.O.), stainless steel 1½" x 1½"- "L" shaped

U. **Under Counter Waste Receptacle:** (**A22),** provide waste receptacle (at all restrooms with sinks) complying with the following:

1. Products: Available products include the following:

   a. Manufacturer: Bobrick Washroom Equipment, Inc.
   b. Product: Model B2260 – 13-gallon capacity, 22-inch-tall stainless steel; open top trash receptacle.

V. **Tens-A-Barrier:** (**A23),** provide complying with the following:

1. Products: Available products include the following:
   a. Manufacturer: Tensabarrier.
   b. Product: Model 896CM Concealed Wall Mini Mount.
2. Mounting: Surface mounted.
3. Exposed Material and Finish: Black and stainless steel, No. 4 finish (satin).

W. **Folding Shower Seat:** (**A24)**, provide folding shower seat (at all transfer showers) complying with the following:

1. Products: Available products include the following:
   a. Manufacturer: Bobrick
   b. Product: Model B5181
2. Configuration: L-shaped seat.
3. Mounting: Wall mounted.
4. Finish: Solid surface seat aluminum frame (brushed).
5. Blocking: Fire Treated Wood or Galvanized Steel (12 GA) blocking concealed within wall.
6. Mount at ht. required by ADA regulations and seal all through wall fasteners

X. **Shower Curtain and Rod:** (**A26)**

1. Products: Available products include the following:
   a. Manufacturer:
   b. Product: Model B-207; including opaque shower curtain and shower curtain hooks
2. Finish: Stainless steel (satin).

Y. **Recessed Soap Shelf: (A27)**

1. Products: Refer to the tile specifications
2. Provide 2 per shower

Z. **Purse Pouch:** (**A29),** provide sanitary napkin vendor (at all women's restrooms) complying with the following:

1. Products: Available products include the following:
   a. Manufacturer: Jacknob
   b. Product: model 110300
2. Concealed fasteners; stainless steel; mount near each toilet.

AA. **Hand Sanitizers:** (**A30)**

1. Provided by Owner installed by General Contractor to meet ADA requirements; align with top of light switch.

END OF SECTION 10801

SECTION 11132 – PROJECTION SCREENS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Electrically operated, ceiling recessed, front projection screens.

1.2 RELATED SECTIONS

A. Section 05500 - Metal Fabrications: Suspension systems for projection screens and / or projector lifts and mounts.

B. Section 09260 - Ceiling Suspension System: Supports and trim for suspended ceilings; Gypsum Board Assemblies: Ceiling for recessed screen installation.

1.3 ACTION SUBMITTALS

A. Submit under provisions of Section 01330 “Submittal procedures.”

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Wiring diagram for electrically operated units.

D. Shop Drawings: Shop drawings showing layout and types of projection screens. Show the following:
   1. Location of screen centerline.
   2. Location of wiring connections.
   3. Seams in viewing surfaces.
   4. Detailed drawings for concealed mounting.
   5. Connections to suspension systems.
   6. Anchorage details.
   7. Accessories.
   8. Frame details.

E. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

F. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain each type of projection screen required from a

single manufacturer as a complete unit, including necessary mounting hardware and accessories.

B. Coordination of Work: Coordinate layout and installation of projection screens with other construction supported by, or penetrating through, ceilings, including light fixtures, HVAC equipment, fire-suppression system, and partitions.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver projection screens until building is enclosed and other construction where screens will be installed is substantially complete.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Protect screens from damage during delivery, handling, storage, and installation.

1.6 COORDINATION

A. Coordinate work with installation of ceilings, walls, electric service power characteristics, and location.

1.7 CLOSEOUT SUBMITTALS

A. Refer to Section 01770 “Closeout Procedures.”

B. Maintenance data.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Manufacturer: Draper, Inc., or Architect approved equal, located at: 411 S. Pearl P. O. Box 425 ; Spiceland, IN 47385-0425; Toll Free Tel: 800-238-7999; Tel: 765-987-7999; Fax: 866-637-5611; Email: request info (drapercontract@draperinc.com); Web: www.draperinc.com

B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 MOTORIZED, CEILING RECESSED, FRONT PROJECTION SCREENS

A. Draper Signature/Series E: Electric motor operated, extruded aluminum case, independently motorized closure. Extruded aluminum case, finished white. UL approved "Suitable for use in environmental air space." Case size 9-3/4 inches (248 mm) deep and 9-1/8 inches (232 mm) wide for screen sizes through 144 inches wide; 11 inches (279 mm) x 9-1/8 inches (232 mm) for larger screen sizes. Bottom of case fully enclosed by aluminum panels and motorized aluminum trap door with

concealed hinges. Trap door supported entirely along front and back edges without crack around perimeter of door. Trap door opens into case when screen is lowered. Closure panels screw-attached to case and may be removed manually for access to roller and drive assembly. Case shall have white finish.

1. Motor mounted inside screen roller on rubber isolation insulators. Motor UL certified, rated 110-120V AC, 60 Hz, three wire, instantly reversible, lifetime lubricated with pre-set accessible limit switches. Motor with overload protection and electric brake.

2. Motor Screen Controls, UL certified.

    a. Low voltage control unit with three button 24V switches and cover plate to stop or reverse screen at any point. Provide @ 2 locations & coordinate with the projector lift controls; interface the controls to operate together with pre-set stop points for projector lift. Provide infrared wireless controller for remote operation.

3. Projection Viewing Surface:

    a. Matt white, washable surface. For use with any type projector where light can be controlled. GREENGUARD certified.

4. Viewing Area H x W.

    a. Video Format (16:10). Black masking borders standard.

        1) 137 inch diagonal, 72 ½” high x 116” wide.

5. Provide an extra screen drop with an overall screen drop of 12 inches with a black masking top border.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify rough-in openings are properly prepared.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for

achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install front projection screens with screen cases in position and relationship to adjoining construction as indicated, securely anchored to supporting substrate, and in manner that produces a smoothly operating screen with plumb and straight vertical edges and plumb and flat viewing surfaces when screen is lowered.

C. Test electrically operated units to verify that screen, controls, limit switches, closure and other operating components are in optimum functioning condition.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 11132

SECTION 11451 - APPLIANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Cooking appliances including:
    a. Microwave / Vent.

2. Refrigerator/freezers/refrigerators with ice maker and water dispenser.
3. Cleaning appliances:
    a. Disposal.
    b. Dishwasher.

B. Related Sections include the following:

1. Division 6 Section "Interior Architectural Woodwork" for custom-made cabinets and solid-surfacing-material countertops that receive appliances.
2. Division 15 and 16 Sections for services and connections to appliances.
3. Appendix B – Owner furnished furniture, fixtures, and equipment.

C. FBO warming and refrigerated cabinet appliances shall be provided by the Owner. Receiving, coordination, rough-in, hook-up and installation of the appliances shall be by the Contractor.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include operating characteristics, dimensions of individual appliances, and finishes for each appliance. Energy star rating where available. Shall be provided directly by the appliance manufacturer and not the installation contractor.

B. Appliance Schedule: For appliances; use same designations indicated on Drawings or Schedule as specified. Shall be provided directly by the appliance manufacturer and not the installation contractor.

C. Manufacturer Certificates: Signed by manufacturers certifying that products comply with requirements and are energy star compliant. Provide energy ratings where available and specified. Provide documentation for local utility rebate to be pursued by the Owner.

Product certifications shall be provided directly by the appliance manufacturer and not the installation contractor.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for each product. Product certifications shall be provided directly by the appliance manufacturer and not the installation contractor.

E. Maintenance Data: For each product to include in maintenance manuals. Product certifications shall be provided directly by the appliance manufacturer and not the installation contractor.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.

B. Product Options: Information on Drawings and in Specifications establishes requirements for product's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

C. Energy Ratings: Provide appliances that carry labels indicating energy-cost analysis (estimated annual operating costs) and efficiency information as required by the FTC Appliance Labeling Rule. Product certifications shall be provided directly by the appliance manufacturer and not the installation contractor.

D. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.5 WARRANTY

A. Special Warranties: Manufacturer's standard form in which manufacturer of each appliance specified agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.

1. Refrigerator/Freezer: Five-year limited warranty for in-home service on the sealed refrigeration system.

B. Warranties for products shall be provided directly by the appliance manufacturer and not the installation contractor.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Basis-of-Design Product: The design for each residential appliance is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 REFRIGERATION APPLIANCES

A. Refrigerator/Freezer:

1. Basis-of-Design Product: General Electric Company; Side-By-Side Refrigerator with Ice & Water Dispenser Model# GSS25LSL, energy star compliant, or a comparable product by one of the following:

a. Whirlpool

2. Provide valved water supply and connecting flexible piping to ice maker and chilled water.

B. Dishwasher:

1. Basis-of-Design Product: Bosch 300 Series – 18” Stainless Steel Dishwasher, or Architect and Owner approved equal.

C. Under Counter Refrigerator:

1. Basis-of-Design Product: U-Line; Model number 2224R-GL-INT-OOB, 2000 Series, under counter refrigerator with tempered glass door with integrated wood frame, 4.9 Cu. Ft., digital touch pad controls, (3) three adjustable tempered glass shelves and internal LED lighting.

2.3 CLEANING APPLIANCES

A. Disposal:

1. Basis-of-Design Product: General Electric Company; 3/4 Horsepower Continuous Feed Disposer Model# GFC720V:

a. Badger

b. Salvajor

2.4 COOKING APPLIANCES

A. Micro-wave (Counter Mounted &-Stacked- Units, as indicated on the drawings:

1. Basis-of-Design Product: General Electric Company; 2.2 CU. FT. Countertop Sensor Micro-Wave Oven PES7227SLSS:

B. Coffee Maker-By Owner

2.5 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Examine roughing-in for piping systems to verify actual locations of piping connections before equipment installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Comply with manufacturer's written instructions.

B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.

C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

D. Utilities: Refer to Divisions 15 and 16 for plumbing, mechanical, and electrical requirements.

3.3 CLEANING AND PROTECTION

A. Test each item of appliances to verify proper operation. Make necessary adjustments.

B. Verify that accessories required have been furnished and installed.

C. Remove packing material from appliances and leave units in clean condition, ready for operation.

3.4 DEMONSTRATION

A. The manufacturer shall provide a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain appliances. Refer to Division 1 Section "Demonstration and Training."

END OF SECTION 11451

SECTION 12481 – WALK OFF ENTRANCE GRILLE & MATTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Aluminum framed walk off grilles and carpeted matts at the entrances to the building.

1.3 REFERENCES

A. ASTM B 221-93 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
B. ASTM A 276-92 Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
C. AAMA 606.1 Voluntary Guide Specifications and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum
D. AAMA 607.1 Voluntary Guide Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.

1.4 COORDINATION

A. Coordinate size and location of recesses in concrete to receive floor grilles and frames.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details for horizontal louver blinds based on field verified window opening dimensions.

C. Samples for Verification: For each type and color of horizontal louver blind indicated.

1. Color samples; 12’ x 12”.

2. Perimeter trim samples and grille samples; 12” x 12”.

D. Product Certificates: For each type of grille or matt, signed by product manufacturer.

E. Maintenance Data: For grilles and matts to include in maintenance instructions.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain grilles and matts through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide horizontal louver blinds with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Flame-Resistance Ratings: Passes NFPA 701.

C. Product Standard: Provide horizontal louver blinds complying with WCSC A 100.1.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver horizontal louver blinds in factory packages, marked with manufacturer and product name, lead-free designation, and location of installation using same designations indicated on Drawings and in a window treatment schedule.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not grille and matts until construction and wet and dirty finish work in spaces, including painting, is complete. For interior matts finishes and exterior work should be completed, and the building should be dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where grilles and matts are indicated to be recessed and fit to other construction, verify dimensions of other construction by field measurement and layout confirmation before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.9 FIELD CONDITIONS

A. Field Measurements: Indicate measurements on Shop Drawings.

1.10 WARRANTY

A. Provide manufacturer's written warranty.

B. Warrant materials and fabrication against defects after completion and final acceptance of Work.

C. Repair defects, or replace with new materials, faulty materials or fabrication developed during the warranty period at no expense to Owner.

PART 2 - PRODUCTS

2.1 Accessibility Standard:

A. Comply with applicable provisions in [the DOJ's "2010 ADA Standards for Accessible Design"] [and] [ICC A117.1] <Insert regulation>.

2.2 ACCEPTABLE MANUFACTURERS

A. Rigid Floor Grille: 100 percent recycled, nylon-reinforced, buffed-carpet tread strips, alternating with mill finish aluminum divider-bars, 3/4 inches high, with perimeter aluminum trim square edge trim angle, and rubber edge strip at both edges in path of travel,. Model number RGR34. Manufactures full range of color selection.

1. Basis-of-Design Product: American Floor Matts; www. Americanflormatts.com, or Architect approved equal.
2. Rolling Load: 1000 lb. per wheel.
3. Tread Inserts: 100 percent recycled, nylon-reinforced buffed rubber with minimum 59 percent postconsumer and 22 percent pre-consumer recycled content, mechanically secured to tread rails.
4. Colors, Textures, and Patterns of Inserts: Manufacture’s full color range.
5. Rail Color: Mill finish aluminum.

B. Floor Matts: American Floor Matts RCRDGRM, or Architect approved equal, 9/16-inch-thick, Specialized Nylon Roll Goods: 100 percent Premium Polyamide Nylon Fiber (6.6) with Polypropylene base grid as follows:

1. Carpet Ridge: 9/16-inch-thick with high density anti-slip rubber backing, 103 oz/sq.yd. Color to be selected from manufacture’s full range of colors selected by the Architect from full range of manufacture’s colors.

2.. Options & Accessories:

a. Ultra Flex Premium Sewn-on Nosing

b. Adhesive for Mounting: Multi-Bond Adhesive as recommended by manufacturer

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install grilles and matts level and flush with adjoining surfaces according to manufacturer's written instructions; level substrate as required to ensure that there is no lippage at the perimeter of the grille or mat.

3.3 ADJUSTING & CLEANING

A. Adjust top surface of assembly to be flush with adjacent finishes.

B. Coordinate top of surfaces with doors that swing across surface to provide adequate under door clearance.

C. Clean dirt and debris from frame recess before installing floor system.

3.4 PROTECTION & REPAIR

A. Replace materials that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion

B. Upon completion of frame installations, provide temporary filler of plywood or fiberboard in grille recesses, and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near time of Substantial Completion.

C. Install product when no further wheeled construction traffic will occur and wet type operations including painting and decorating are com

END OF SECTION 12481

SECTION 12491 - HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Horizontal louver blinds with aluminum slats to match the Airport Administration Office, the Lobby store front windows will not need blinds.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details for horizontal louver blinds based on field verified window opening dimensions.

C. Samples for Verification: For each type and color of horizontal louver blind indicated.

1. Slat: Not less than 12 inches long, color to be selected by Architect from manufacturers full range of colors and finishes.

2. Color samples.

D. Window Treatment Schedule: For horizontal louver blinds. Use same designations indicated on Drawings.

E. Product Certificates: For each type of horizontal louver blind, signed by product manufacturer.

F. Maintenance Data: For horizontal louver blinds to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain horizontal louver blinds through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide horizontal louver blinds with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to

authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Flame-Resistance Ratings: Passes NFPA 701.

C. Product Standard: Provide horizontal louver blinds complying with WCSC A 100.1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver horizontal louver blinds in factory packages, marked with manufacturer and product name, lead-free designation, and location of installation using same designations indicated on Drawings and in a window treatment schedule.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet and dirty finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Horizontal Louver Blinds: Before installation begins, for each size, color, texture, pattern, and gloss indicated, full-size units equal to 5 percent of amount installed, but no fewer than 4 units.

PART 2 - PRODUCTS

2.1 HORIZONTAL LOUVER BLINDS, ALUMINUM SLATS

A. Products: Subject to compliance with requirements, provide one of the following:

1. Hunter Douglas; Décor.
2. Levolor, a Newell Rubbermaid Company; Riviera.
3. Springs Window Fashions Division, Inc.; Graber; Performance Series.

B. Slats: Aluminum; alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radiused corners.

1. Width: 1 inch.

a. Spacing: Manufacturers Standard.

2. Thickness: Manufacturer's standard.
3. Finish: One color.

a. Ionized Coating: Antistatic, dust-repellent, baked polyester finish.

C. Headrail: Formed steel or extruded aluminum; long edges returned or rolled; fully enclosing operating mechanisms on three sides and end plugs and the following:

1. Capacity: One blind per headrail.
2. Light-blocking lower back lip.

D. Bottom Rail: Formed-steel or extruded-aluminum tube, with plastic or metal capped ends top contoured to match crowned shape of slat and bottom contoured for minimizing light gaps; with enclosed ladders and tapes to prevent contact with sill.

E. Ladders: Evenly spaced to prevent long-term slat sag.

1. For Blinds with Nominal Slat Width 1 Inch or Less: Braided string.

F. Lift Cords: Manufacturer's standard.

G. Tilt Control: Enclosed worm-gear mechanism, slip clutch or detachable wand preventing overrotation, and linkage rod, and the following:

1. Tilt Operation: Manual with clear plastic wand.
2. Length of Tilt Control: Length required to make operation convenient from floor level.
3. Tilt: Full.

H. Lift Operation: Manual, top-locking cord lock; locks pull cord to stop blind in either fully opened or fully closed position only and is equipped with a ring pull not more than 4 inches long.

I. Valance: Two slats.

1. Finish Color Characteristics: Match color, texture, pattern, and gloss of slats.

J. Mounting: Ceiling mounting, permitting easy removal and replacement without damaging blind or adjacent surfaces and finishes; with spacers and shims required for blind placement and alignment indicated.

1. Provide intermediate support brackets if end support spacing exceeds spacing recommended by manufacturer for weight and size of blind.

K. Colors, Textures, Patterns, and Gloss: As selected by Architect from manufacturer's full range.

2.2 HORIZONTAL LOUVER BLIND FABRICATION

A. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.

1. Lift-and-Tilt Mechanisms: With permanently lubricated moving parts.

B. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F :

1. Blind Units Installed outside Jambs: Width and length as indicated, with terminations between blinds of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.

C. Installation Brackets: Designed for easy removal and reinstallation of blind, for supporting headrail, valance, and operating hardware, and for hardware position and blind mounting method indicated.

D. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to blind hardware and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.

E. Color-Coated Finish:

1. Metal: For components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

F. Component Color: Provide rails, cords, ladders, and exposed-to-view metal and plastic matching or coordinating with slat color, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install horizontal louver blinds level and plumb and aligned with adjacent units according to manufacturer's written instructions, and located so exterior slat edges in any position are not closer than 2 inches to interior face of glass. Install intermediate support as required to prevent deflection in headrail. Allow clearances between adjacent blinds and for operating glazed opening's operation hardware if any.

B. Head Mounted: Install headrail on face of opening head.

3.3 ADJUSTING

A. Adjust horizontal louver blinds to operate smoothly, easily, safely, and free of binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

A. Clean horizontal louver blind surfaces after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.

C. Replace damaged horizontal louver blinds that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 12491

SECTION 12615 – PUBLIC SEATING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes Lounge Chair Seating with side tables; SYNK2 with side tables including power and USB charging stations for airport terminals, as the Basis of Design. The seating for this project will be provided as part of an allowance.

1.3 RELATED SECTIONS

A. Division 09680 Carpet for coordination and sequencing of work. Division 16 Electrical for wiring and connection of power charging stations.

1.4 SUBMITTALS

A. Product Data: For each seating module and table module indicated, and power poles for charging stations.

B. Installation Drawings: Layout plans and system details showing seating layout, chair widths, table widths and locations.

C. Samples: Prepare samples from the same material to be used for the work.

D. Maintenance data.

E. Graphics for power pole – charging stations.

1.5 QUALITY ASSURANCE

A. Upholstery Vinyl Source Limitations: Obtain vinyl of a single dye lot for each color required.

B. Bidder Qualifications: The successful bidder shall be authorized to distribute the specified seating. These dealerships shall be contractually committed to meet the manufacture’s quality standards both in distribution and installation services.

C. The authorized dealer must have written evidence to support the mutually agreed upon Dealer Agreement. This agreement contains both dealer and manufacturer

obligations for servicing and installation. Dealers are also required to maintain a reputation for high quality service, consultative selling, and business integrity and to render prompt and courteous service with respect to every product in this contract.

D. Selected dealer shall provide an installation staff authorized to install, service and provide expertise to manage the warranties associated with the specified seating product.

1.6 WARRANTY

A. General Warranty: Provide manufacturers standard warranty against defects in materials and workmanship for a period as specified below. Any defects or failure, expecting ordinary wear and tear, shall be repaired or replaced by the Manufacturer and or Dealership promptly upon receipt of written notice from the Owner. Warranty shall cover all shipping, taxes, materials and labor.

1. Warranty Period
   a. Upholstery: 12 years from date of manufacture
   b. Frame 12 years from date of manufacture
   c. Arms: 12 years from date of manufacture
   d. Tables 12 years from date of manufacture

1.7 SUBMITTALS

A. Samples of all fabric, hardware, metal and laminate for verification and acceptance of the materials to be provided.

B. Seating layout showing existing chairs and tables, new chairs and tables for the Lobby area. The chairs shall be installed after finish is completed.

PART 2 – PRODUCTS

2.1 PUBLIC SEATING

A. Basis of Design – Lounge Chair Synk2 with custom laminate side tables including power and USB charging stations at the fac of the side table.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install seats and tables level and plumb-ganged seats must be assembled at the factory.

B. Repair minor abrasions and imperfections in finishes as suggested by manufactured instructions.

C. Replace seat and back vinyl damaged during installation. Do not use Owner's extra materials, stock for replacement of damaged vinyl during installation, unless directed by Owner or their agent.

D. Remove all trash, shipping containers, etc. from project site and dispose of properly.

E. Vacuum floor, and wipe clean the areas with seating after installation. Repair floor, wall, or ceiling finishes, if damaged during installation.

F. Coordinate with the Contractor's schedule and the project phasing requirements for both permanent and temporary seating arrangements.

3.2 TESTING

A. The seating module must pass the following ANSI/BIFMA tests:

1. X5.4-1983, 17 test for leg strength which calls for a 75-pound functional load and 125-pound proof load.
2. X5.4-1983, 5 test for horizontal back strength, which calls for a 150-pound functional load and a 250-pound proof load.
3. X5.4-1983, 16 test for base loading, which calls for 2,500 pounds applied twice.
4. X5.4-1983, 18 test for unit drop, which calls for three 12-inch drops and one 24-inch drop.
5. X5.4-1983, 15 test for structural durability, which calls for 100,000 cycle.

B. The seating module must pass the following additional tests:

1. Arm loading test that passes 50,000 cycles of 200.
2. Impact test that passes 200-pound, 112-inch drop impact with a 1/8" permanent set maximum allowable performance requirement.
3. Humidity shock test.
4. Swinging impact chair backs test with 100,000 cycles of 105-pound load at 7" impact with no affect.
5. Attachment strength of chair fasteners test with a 600-pound performance requirement.

END OF SECTION 12615

SECTION 12931 – BICYCLE BOLLARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Provisions and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Bicycle post bollard.

B. Related Sections include the following:

1. Division 3 Section "Cast-In-Place Concrete."
2. Division 5 Section "Metal Fabrications."

1.3 - REFERENCES

A. American Society for Testing and Materials ASTM A 513 – Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.

B. American Society for Testing and Materials ASTM A 500B – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

1.4 - SUBMITTALS

A. Manufacturer’s data sheets on each product to be used, included:
   1. Preparation instructions and recommendations.
   2. Maintenance requirements and recommendations.

B. Shop Drawings: Manufacturing details, dimensions, and mounting for each bicycle bollard post(s).

1.5 – QUALITY ASSURANCE

A. Manufacturer’s Qualifications:
   1. A firm experienced in manufacturing bicycle bollard post(s) similar to those required for this project and with a record of successful in-service performance.

B. Installer Qualifications:
   1. An experienced installer who has completed installation of bicycle bollard post(s) similar in material, design, and extent to that indicated for this project

and whose work has resulted in construction with a record of successful in-service performance.

C. Source Limitations: Obtain each color, finish, shape and type of bicycle bollard post(s) (if multiple posts are required) from a single source with resources to provide components of consistent quality in appearance and physical properties.

1.6 – DEILVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 – PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

2.1 - MANUFACTURERS

A. Contractor will select manufacturers known for producing quality bicycle bollard post(s).
B. The basis of design for the bicycle post shall be Model BKR-35 as manufactured by Victor Stanley, Inc. 1-800-368-2573.

1. 3" outside diameter tube steel bollard.
2. In-ground mounted.
3. TGIC polyester powder coatings.

2.4 - MATERIALS

A. Steel Tube: ASTM A 513, electric welded steel tubing.

B. Steel Pipe: ASTM A 500B steel pipe.

2.5 - FINISH

A. Manufacturer's standard factory applied polyester paint finishes using a powder coating heat cured system. Color as approved by the Architect.

1. All fabricated components shall be shotblasted, etched, phosphatized,

preheated, and electrostatically powder-coated with TGIC polyester powder coatings.
2. Products shall be fully cleaned and pretreated, preheated and coated while hot to fill crevices and build coating film.
3. Coated parts shall fully cure to coating manufacturer's specifications.
4. Thickness of the finish coat shall be 8-10 mils.

B. Manufacturer's standard hot dipped galvanized steel finish.

1. Prior to powder coating, components shall receive hot dipped galvanizing.
2. Galvanizing of lids shall be as per manufacturer's standard process.

C. Coat all embedded metal components (concealed) with bituminous coating.

PART 3 - EXECUTION

3.1 - EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 - INSTALLATION

A. Bicycle bollard post(s) shall be securely set into a thickened footing isolated from the pad and sidewalk.

B. Concrete Foundation & Pad

1. Material: Portland Cement Concrete

2. Curing: See 201 FDOT Specification 520-8

3. Strength: 2,500 psi @ 28 days

4. Finish: Concealed below sidewalk; not applicable

5. Dimensions: The thickened footing shall be 33 inches deep minimum, and 14 inch diameter and set below the bottom face of side walk. Use sonotube for casting the footing; and, provide an isolation joint around the bollard. The dimensions & thickness of the bicycle parking area pad shall be per the Drawings.

3.3 - PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion

END OF SECTION 12931

SECTION 13341 - METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes metal building systems that consist of integrated sets of mutually dependent components including structural framing, roof panels, wall panels, soffit panels, doors and accessories.

B. Related Sections include the following:

1. Division 3 Section "Cast-in-Place Concrete" for concrete foundations, slabs, and anchor-bolt installation.
2. Division 7 Section "Building Insulation" for insulation installed in metal roof and wall panel assemblies, “Caulking and Sealants”, and “Metal Wall Panels”.
3. Division 8 Section for “Metal Doors and Frames” and “Overhead Ceiling Doors”
4. Division 9 painting Sections for finish painting of shop-primed structural framing and “Gypsum Board Assemblies”.
5. Division 10 Section for “Louvers and Dampers”.

1.3 DEFINITIONS

A. Bay: Dimension between main frames measured normal to frame (at centerline of frame) for interior bays, and dimension from centerline of first interior main frame measured normal to end wall (outside face of end-wall girt) for end bays.

B. Building Length: Dimension of the building measured perpendicular to main framing from end wall to end wall (outside face of girt to outside face of girt).

C. Building Width: Dimension of the building measured parallel to main framing from sidewall to sidewall (outside face of girt to outside face of girt).

D. Clear Span: Distance between supports of beams, girders, or trusses (measured from lowest level of connecting area of a column and a rafter frame or knee).

E. Eave Height: Vertical dimension from finished floor to eave (the line along the sidewall formed by intersection of the planes of the roof and wall).

F. Clear Height under Structure: Vertical dimension from finished floor to lowest point of any part of primary or secondary structure, not including crane supports, located within clear span.

G. Terminology Standard: Refer to MBMA's "Metal Building Systems Manual" for definitions of terms for metal building system construction not otherwise defined in this Section or in referenced standards.

1.4 SYSTEM DESCRIPTION

A. General: Provide a complete engineered, integrated set of metal building system manufacturer's standard mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior. Include primary and secondary framing, metal roof panels, metal wall panels, and accessories complying with requirements indicated.

1. Provide metal building system of size and with spacing's, slopes, and spans indicated.

2. Provide metal framing of size and spacing's, spans required for hangar door assembly and installation.

3. Provide sub framing and blocking required for door, window louvers, signage or other exterior mounted building components.

B. Primary Frame Type:

1. Rigid Clear Span: Solid-member, structural-framing system without interior columns.

C. End-Wall Framing: Provide primary frame, capable of supporting full-bay design loads, and end-wall columns.

D. Secondary Frame Type: Manufacturer's standard purlins and joists and exterior-framed (bypass) girts.

E. Eave Height: Manufacturer's standard height, as indicated by nominal height on Drawings. Manufacturer's standard spacing, as indicated.

F. Bay Spacing: By nominal bay spacing on drawings.

G. Roof Slope: 1 inch per 12 inches, U.O.N.

H. Roof System: Manufacturer's standard vertical-rib, standing-seam metal roof panels.

I. Exterior Wall System: Manufacturer's standard field-assembled, metal wall panels, with filed installed insulation.

1.5 SYSTEM PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal building systems capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Engineer metal building systems according to procedures in MBMA's "Metal Building Systems Manual."
2. Design Loads: As required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures." And the Florida Building Code latest edition in effect and the local Authorities Having Jurisdiction.
3. Live Loads: Include vertical loads induced by the building occupancy indicated on Drawings. Include loads induced by maintenance workers, materials, and equipment for roof live loads.

    a. Building Occupancy: As indicated on drawings.
4. Wind Loads: Include horizontal loads induced by a basic wind speed corresponding to a 50-year, mean-recurrence interval at Project site.
5. Collateral Loads: Include additional dead loads other than the weight of metal building system for permanent items such as sprinklers, mechanical systems, electrical systems, and ceilings, minimum 7 pounds per square foot.
6. Auxiliary Loads: Include dynamic live loads, such as those generated by cranes and materials-handling equipment indicated on Drawings.
7. Load Combinations: Design metal building systems to withstand the most critical effects of load factors and load combinations as required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures." And with the 2006 International Building Code.
8. Deflection Limits: Engineer assemblies to withstand design loads with deflections no greater than the following:

    a. Purlins and Rafters: Vertical deflection of 1/180 of the span.
    b. Girts: Horizontal deflection of 1/240 of the span.
    c. Metal Roof Panels: Vertical deflection of 1/180 of the span.
    d. Metal Wall Panels: Horizontal deflection of 1/240 of the span.

9. Design secondary framing system to accommodate deflection of primary building structure and construction tolerances, and to maintain clearances at openings.
10. Provide metal panel assemblies capable of withstanding the effects of loads and stresses indicated, based on testing according to ASTM E 1592.

B. Thermal Movements: Provide metal panel systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

C. Air Infiltration for Metal Roof Panels: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of roof area when tested according to ASTM E 1680 at negative test-pressure difference of 1.57 lbf/sq. ft..

D. Air Infiltration for Metal Wall Panels: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of wall area when tested according to ASTM E 283 at static-air-pressure difference of 6.24 lbf/sq. ft..

E. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E 1646 at test-pressure difference of 2.86 lbf/sq. ft..

F. Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E 331 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft..

G. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for Class 90.

1.6 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of the following metal building system components:

1. Structural-framing system and engineered bracing and erection drawings.
2. Metal roof panels.
3. Metal wall panels .
4. Insulation and vapor retarders.
5. Flashing and trim.
6. Doors.
7. Accessories.
8. Windows.
9. Louvers.
10. Florida Product Approval Certifications for exterior building elements, if required by Authorities Having Jurisdiction.

B. Shop Drawings: For the following metal building system components. Include plans, elevations, sections, details, and attachments to other work.

1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation, licensed in the State of the metal building installation.
2. Anchor-Bolt Plans: Submit anchor-bolt plans before foundation work begins. Include location, diameter, and projection of anchor bolts required to attach metal building to foundation. Indicate column reactions at each location.
3. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.

4. Metal Roof and Wall Panel Layout Drawings: Show layouts of metal panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.

    a. Show roof-mounted items including equipment supports, pipe supports and penetrations, lighting fixtures, skylights, roof vents, and items mounted on roof curbs.
    b. Show wall-mounted items including doors, louvers, and lighting fixtures.
    c. Show translucent panels.

5. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:

    a. Flashing and trim.
    b. Gutters.
    c. Downspouts.
    d. Roof ventilators.
    e. Louvers.
    f. Service walkways.
    g. Windows and doors.

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of sizes indicated below.

1. Metal Roof and Wall Panels: Nominal 12 inches long by actual panel width. Include fasteners, closures, and other exposed panel accessories.

D. Product Certificates: For each type of metal building system, signed by product manufacturer.

1. Letter of Design Certification: Signed and sealed by a qualified professional engineer licensed in the State of the metal building installation. Include the following:

    a. Name and location of Project.
    b. Order number.
    c. Name of manufacturer.
    d. Name of Contractor.
    e. Building dimensions including width, length, height, and roof slope.
    f. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
    g. Governing building code and year of edition.
    h. Design Loads: Include dead load, roof live load, collateral loads, deflection, wind loads/speeds and exposure and auxiliary loads (cranes).
    i. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
    j. Building-Use Category: Indicate category of building use and its effect on load importance factors.

k. AISC Certification for Category MB: Include statement that metal building system and components were designed and produced in an AISC-Certified Facility by an AISC-Certified Manufacturer.

E. Welding certificates.

F. Erector Certificate: Signed by manufacturer certifying that erector complies with requirements.

G. Manufacturer Certificate: Signed by manufacturer certifying that products comply with requirements.

H. Qualification Data: For Erector manufacturer professional engineer.

I. Material Test Reports: Signed by manufacturers certifying that the following products comply with requirements:

1. Structural steel including chemical and physical properties.
2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
3. Tension-control, high-strength, bolt-nut-washer assemblies.
4. Shop primers.
5. Non-shrink grout.

J. Source quality-control test reports.

K. Field quality-control test reports.

L. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for insulation and vapor retarders. Include reports for thermal resistance, fire-test-response characteristics, water-vapor transmission, and water absorption.

M. Maintenance Data: For metal panel finishes and door hardware to include in maintenance manuals.

N. Warranties: Special warranties specified in this Section.

O. Other Action Submittals:

1. Door Schedule: For doors and frames. Use same designations indicated on Drawings. Include details of reinforcement.

a. Door Hardware Schedule: Include details of fabrication and assembly of door hardware. Organize schedule into door hardware sets indicating complete designations of every item required for each door or opening.
b. Keying Schedule: Detail Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

2. Refer to Section “Metal Doors and Frames” for specific project requirements.

1.7 QUALITY ASSURANCE

A. Erector Qualifications: An experienced erector who has specialized in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.

B. Manufacturer Qualifications: A qualified manufacturer and member of MBMA.

1. AISC Certification for Category MB: An AISC-Certified Manufacturer that designs and produces metal building systems and components in an AISC-Certified Facility.
2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

C. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated, as documented according to ASTM E 548.

D. Source Limitations: Obtain primary metal building system components, including structural framing and metal panel assemblies, through one source from a single manufacturer.

E. Product Options: Drawings indicate size, profiles, and dimensional requirements of metal building system and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

F. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

G. Structural Steel: Comply with AISC's "Specification for Structural Steel Buildings--Allowable Stress Design, Plastic Design," or AISC's "Load and Resistance Factor Design Specification for Structural Steel Buildings," for design requirements and allowable stresses.

H. Cold-Formed Steel: Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members," or AISI's "Load and Resistance Factor Design Specification for Steel Structural Members," for design requirements and allowable stresses.

I. Fire-Resistance Ratings: Where indicated, provide metal panel assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Combustion Characteristics: ASTM E 136.
2. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
3. Metal panels shall be identified with appropriate markings of applicable testing and inspecting agency.

J. Surface-Burning Characteristics: Provide field-insulated metal panels having thermal insulation and vapor-retarder-facing materials with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Flame-Spread Index: 25 or less, unless otherwise indicated.
2. Smoke-Developed Index: 450 or less, unless otherwise indicated.

K. Pre-Erection Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to metal building systems including, but not limited to, the following:

1. Inspect and discuss condition of foundations and other preparatory work performed by other trades.
2. Review structural load limitations.
3. Review and finalize construction schedule and verify availability of materials, Erector's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review required testing, inspecting, and certifying procedures.
5. Review weather and forecasted weather conditions and procedures for unfavorable conditions.

L. Pre-installation Roof Assembly Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:

1. Examine purlin and rafter conditions for compliance with requirements, including flatness and attachment to structural members.
2. Review structural limitations of purlins and rafters during and after roofing.
3. Review flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
4. Review temporary protection requirements for metal roof panel assembly during and after installation.
5. Review roof observation and repair procedures after metal roof panel installation.

M. Pre-installation Wall Assembly Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:

1. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
2. Review structural limitations of girts and columns during and after wall panel installation.
3. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
4. Review temporary protection requirements for metal wall panel assembly during and after installation.

5. Review wall observation and repair procedures after metal wall panel installation.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness and with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

1.9 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements:

1. Established Dimensions for Foundations: Comply with established dimensions on approved anchor-bolt plans, establishing foundation dimensions and proceeding with fabricating structural framing without field measurements. Coordinate anchor-bolt installation to ensure that actual anchorage dimensions correspond to established dimensions.
2. Established Dimensions for Metal Panels: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating metal panels without field measurements, or allow for field trimming metal panels. Coordinate construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.10 COORDINATION

A. Coordinate size and location of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete."

B. Coordinate installation of roof curbs equipment supports and roof penetrations, per the drawings or scheduled or scheduled or specified elsewhere.

C. Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leak-proof, secure, and noncorrosive installation.

1.11 WARRANTY

A. Special Warranty on Metal Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam, metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

3. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Buildings Company.
2. Butler Manufacturing Company.
3. Ceco Building Systems; Division of Robertson-Ceco Corporation.
4. Gulf States Manufacturers, Inc.
5. Metallic Metal Building Company; Division of NCI Building Systems, LLP.
6. VP Buildings, Inc.; a United Dominion Company.
7. Nucor Building Systems Group.
8. Chief Buildings.
9. OSI Building Systems.

2.2 STRUCTURAL-FRAMING MATERIALS

A. W-Shapes: ASTM A 992/A 992M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.

B. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36/A 36M; Grade 50 or 55.

C. Plate and Bar: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55.

D. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.

E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B or C, structural tubing.

F. Structural-Steel Sheet: Hot-rolled, ASTM A 1011/A 1011M, Structural Steel (SS), Grades 30 through 55.

G. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grades 33 through 80 with G60 coating designation; mill phosphatized. Retain paragraph and subparagraphs below for secondary framing if required.

H. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grades 33 through 80 or High-Strength Low Alloy Steel (HSLAS), Grades 50 through 80; with G90 coating designation.

I. Non-High-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A, carbon-steel, hex-head bolts; ASTM A 563 carbon-steel hex nuts; and ASTM F 844 plain (flat) steel washers.

1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

J. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
2. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex-head steel structural bolts with splined ends.

a. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50, baked epoxy coated.

K. Unheaded Anchor Rods: ASTM F 1554, Grade 36.

1. Configuration: Straight.
2. Nuts: ASTM A 563 heavy hex carbon steel.
3. Plate Washers: ASTM A 36/A 36M carbon steel.
4. Washers: ASTM F 436 hardened carbon steel.
5. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

L. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.

1. Nuts: ASTM A 563 heavy hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436 hardened carbon steel.
4. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

M. Threaded Rods: ASTM A 193/A 193M.

1. Nuts: ASTM A 563 heavy hex carbon steel.
2. Washers: ASTM F 436 hardened carbon steel.
3. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

N. Primer: SSPC-Paint 15, Type I, red oxide.

2.3 MATERIALS FOR FIELD-ASSEMBLED METAL PANELS

A. Metallic-Coated Steel Sheet Pre-painted with Coil Coating: Steel sheet metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grades 33 through 80, with G90 coating designation.
2. Surface: Smooth, flat finish.
3. Exposed Finishes: Apply the following coil coating, as specified or indicated on Drawings:

a. High-Performance Organic Finish (2-Coat Fluoropolymer-70% PVDF): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions, except as modified below:

1) Humidity Resistance: 1000 hours.
2) Salt-Spray Resistance: 1000 hours.

b. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored backer finish, consisting of prime coat and wash coat with a total minimum dry film thickness of 0.5 mil.

B. Refer to specification Section 07421 Metal Wall Panels for additional information; the metal panels shall be horizontal ribbed panels, with concealed fasteners.

2.4 THERMAL INSULATION FOR FIELD-ASSEMBLED METAL PANELS

A. Metal Building Insulation: ASTM C 991, Type I, or NAIMA 202, glass-fiber-blanket insulation; 0.5-lb/cu. ft. density; 2-inch- wide, continuous, vapor-tight edge tabs; and with a flame-spread index of 25 or less.

B. Vapor-Retarder Facing: ASTM C 1136, with permeance not greater than 0.02 perm when tested according to ASTM E 96, Desiccant Method.

1. Composition: White polypropylene film facing and fiberglass-polyester blend fabric backing.

C. Retainer Strips: 0.019-inch- thick, formed, galvanized steel or PVC retainer clips colored to match insulation facing.

D. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

E. Refer to Section “Building Insulation” for additional requirements.

2.5 DOOR AND FRAME MATERIALS

A. Refer to Section “Metal Door and Frames” for exterior door requirement and Section “Overhead Ceiling Doors“ for roll up doors.

2.6 MISCELLANEOUS MATERIALS

A. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of plastic caps or factory-applied coating.

1. Fasteners for Metal Roof and Wall Panels: Self-drilling Type 410 stainless-steel or self-tapping Type 304 stainless-steel or zinc-alloy-steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of metal panels.
2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.

B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

C. Gypsum Board: Refer to Section “Gypsum Board Assemblies” for gypsum board requirements. All gypsum board to be 5/8” thick minimum.

D. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

E. Metal Panel Sealants:

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray poly-isobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape of manufacturer's standard size.
2. Joint Sealant: ASTM C 920; one-part elastomeric polyurethane, polysulfide, or silicone-rubber sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weather tight; and as recommended by metal building system manufacturer.

3. Refer to Section “Caulking and Sealants” for additional submittal and product requirements.

2.7 FABRICATION, GENERAL

A. General: Design components and field connections required for erection to permit easy assembly.

1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.

B. Tolerances: Comply with MBMA's "Metal Building Systems Manual": Chapter IV, Section 9, "Fabrication and Erection Tolerances."

C. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

2.8 STRUCTURAL FRAMING

A. General:

1. Primary Framing: Shop fabricate framing components to indicated size and section with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.

    a. Make shop connections by welding or by using high-strength bolts.
    b. Join flanges to webs of built-up members by a continuous submerged arc-welding process.
    c. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
    d. Weld clips to frames for attaching secondary framing members.
    e. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary structural members with specified primer after fabrication.

2. Secondary Framing: Shop fabricate framing components to indicated size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form,

punch, drill, and weld secondary framing for bolted field connections to primary framing.

a. Make shop connections by welding or by using non-high-strength bolts.
b. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary structural members with specified primer after fabrication.

B. Primary Framing: Manufacturer's standard structural primary framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafter, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.

1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.

a. Slight variations in span and spacing may be acceptable if necessary to meet manufacturer's standard, as approved by Architect.

2. Rigid Clear-Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
3. Frame Configuration: Single gable.
4. Exterior Column Type: Tapered.
5. Rafter Type: Tapered.

C. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:

1. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural-steel sheet; with minimum thickness of 0.0598 inch.
2. End-Wall Rafters: C-shaped, cold-formed, structural-steel sheet; with minimum thickness of 0.0598 inch; or I-shaped sections fabricated from shop-welded, built-up steel plates or structural-steel shapes.

D. Secondary Framing: Manufacturer's standard secondary framing members, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Fabricate framing from cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet pre-painted with coil coating, unless otherwise indicated, to comply with the following:

1. Purlins: C- or Z-shaped sections; fabricated from minimum 0.0598-inch- thick steel sheet, built-up steel plates, or structural-steel shapes; minimum 2-1/2-inch- wide flanges.
2. Girts: C- or Z-shaped sections; fabricated from minimum 0.0598-inch- thick steel sheet, built-up steel plates, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees to flange and with minimum 2-1/2-inch- wide flanges.

3. Eave Struts: Unequal-flange, C-shaped sections; fabricated from 0.0598-inch- thick steel sheet, built-up steel plates, or structural-steel shapes; to provide adequate backup for metal panels.
4. Flange Bracing: Minimum 2-by-2-by-1/8-inch structural-steel angles or 1-inch diameter, cold-formed structural tubing to stiffen primary frame flanges.
5. Sag Bracing: Minimum 1-by-1-by-1/8-inch structural-steel angles.
6. Base or Sill Angles: Minimum 3-by-2-by-0.0598-inch zinc-coated (galvanized) steel sheet.
7. Purlin and Girt Clips: Minimum 0.0598-inch- thick, steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.
8. Secondary End-Wall Framing: Manufacturer's standard sections fabricated from minimum 0.0598-inch- thick, zinc-coated (galvanized) steel sheet.
9. Framing for Openings: Channel shapes; fabricated from minimum 0.0598-inch- thick, cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings, and head, jamb, and sill of other openings.
10. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.

E. Canopy and Lean to Framing: Manufacturer's standard structural-framing system, designed to withstand required loads, fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide frames with attachment plates and splice members, factory drilled for field-bolted assembly.

1. Type: As indicated.

F. Bracing: Provide adjustable wind bracing as follows:

1. Rods: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50; or ASTM A 529/A 529M, Grade 50; minimum 1/2-inch- diameter steel; threaded full length or threaded a minimum of 6 inches at each end.
2. Cable: ASTM A 475, 1/4-inch- diameter, extra-high-strength grade, Class B zinc-coated, 7-strand steel; with threaded end anchors.
3. Angles: Fabricated from structural-steel shapes to match primary framing, of size required to withstand design loads.
4. Rigid Portal Frames: Fabricate from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
5. Fixed-Base Columns: Fabricate from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
6. Bracing: Provide wind bracing using any method specified above, at manufacturer's option.

G. Bolts: Provide plain finish bolts for structural-framing components that are primed or finish painted. Provide hot-dipped galvanized bolts for structural-framing components that are galvanized.

H. Factory-Primed Finish: Apply specified primer immediately after cleaning and pretreating.

1. Prime primary, secondary, and end-wall structural-framing members to a minimum dry film thickness of 1 mil.

a. Prime secondary steel framing formed from uncoated steel sheet to a minimum dry film thickness of 0.5 mil on each side.

2.9 METAL ROOF PANELS

A. Trapezoidal-Rib, Standing-Seam Metal Roof Panels: Formed with raised trapezoidal ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels. Exposed metal fasteners for roof panels will not be acceptable.

1. Material: Zinc-coated (galvanized) steel sheet, 0.0269 inch thick.

a. Exterior Finish: Fluoropolymer.
b. Color: As selected by Architect from manufacturer's full range. Color to match existing adjacent metal buildings.

2. Clips: Manufacturer's standard, floating type to accommodate thermal movement; fabricated from zinc-coated (galvanized) steel sheet.
3. Joint Type: Mechanically seamed, folded as standard with manufacturer.
4. Panel Coverage: 24 inches.
5. Panel Height: 3 inches.
6. Uplift Rating: UL 90.

2.10 FIELD-ASSEMBLED METAL WALL PANELS

A. Tapered-Rib-Profile, Exposed-Fastener Metal Wall Panels: Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs; designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Horizontal ribbed metal panels shall match the GA Terminal Building, refer to specification section 07421 Metal Wall Panels for additional information. The metal panels at the back of the parapet, concealed from view, do not need to be ribbed panels.

1. Material: Zinc-coated (galvanized) steel sheet, 0.0209 inch thick.

a. Exterior Finish: Fluoropolymer.
b. Color: As selected by Architect from manufacturer's full range.

2. Major-Rib Spacing: 12 inches o.c.
3. Panel Coverage: 36 inches.
4. Panel Height: 1.25 inches.

2.11 TRANSLUCENT PANELS

A. Fire-Test-Response Characteristics: Provide panels with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Flame Spread: 25 or less.
2. Smoke Developed: 450 or less.

B. Insulated Translucent Panels: Fabricate insulating units of 2 sheets of glass-fiber-reinforced polyester, translucent plastic separated by an air space; complying with ASTM D 3841, Type CC1 (limited flammability), Grade 1 (weather resistant); smooth finish on both sides. Match profile of adjacent metal panels.

1. Exterior Panel Weight: Not less than 8 oz./sq. ft..
2. Interior Panel Weight: Not less than 8 oz./sq. ft..
3. Light Transmittance: Not less than 42 percent according to ASTM D 1494.
4. Metal Edge: Fabricate full length of each side of panel with metal edge for seaming into standing-seam roof panel joint.
5. Color: White.

C. Mastic for Translucent Panels: Nonstaining, saturated vinyl polymer as recommended by translucent panel manufacturer for sealing laps.

2.12 METAL SOFFIT PANELS

A. General: Provide factory-formed metal soffit panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.

B. Metal Soffit Panels: Match profile and material of metal roof and wall panels.

1. Finish: Match finish and color of metal wall panels.

C. Concealed-Fastener Metal Soffit Panels: Formed with vertical panel edges and a single wide recess, centered between panel edges; with flush joint between panels; with 1-inch- wide flange for attaching interior finish; designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps.

1. Material: Zinc-coated (galvanized) steel sheet, 0.0209 inch thick.

a. Exterior Finish: Fluoropolymer.
b. Color: As selected by Architect from manufacturer's full range.

2. Panel Coverage: 16 inches.
3. Panel Height: 1.5 inches.

2.13 ACCESSORIES

A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels, unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.
2. Clips: Manufacturer's standard, formed from stainless-steel sheet, designed to withstand negative-load requirements.
3. Cleats: Manufacturer's standard, mechanically seamed cleats formed from stainless-steel sheet or nylon-coated aluminum sheet.
4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
5. Closure Strips: Closed-cell, expanded, cellular, rubber or cross linked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or pre-molded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
6. Thermal Spacer Blocks: Where metal panels attach directly to purlins, provide thermal spacer blocks of thickness required to provide 1 inch standoff; fabricated from extruded polystyrene.

C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.

1. Closures: Provide closures at eaves and rakes, fabricated of same material as metal wall panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or cross linked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or pre-molded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

D. Flashing and Trim: Formed from minimum 0.0159-inch- thick, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet pre-painted with coil coating; finished to match adjacent metal panels.

1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
2. Opening Trim: Minimum 0.0269-inch- thick, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet pre-painted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.

E. Gutters: Formed from minimum 0.0159-inch- thick, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet pre-painted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."

1. Gutter Supports: Fabricated from same material and finish as gutters; spaced 36 inches o.c.

F. Downspouts: Formed from 0.0159-inch- thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet pre-painted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot- long sections, complete with formed elbows and offsets.

1. Mounting Straps: Fabricated from same material and finish as gutters; spaced 10 feet o.c.

G. Roof Ventilators: Gravity type, complete with hardware, flashing, closures, and fittings.

1. Continuous or Sectional-Ridge Type: Factory-engineered and -fabricated, continuous unit; fabricated from minimum 0.0159-inch- thick, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet pre-painted with coil coating; finished to match metal roof panels. Fabricated in minimum 10-foot- long sections. Provide throat size and total length indicated, complete with side baffles, ventilator assembly, end caps, splice plates, and reinforcing diaphragms.

a. Bird Screening: Galvanized steel, 1/2-inch- square mesh, 0.041-inch wire, or aluminum, 1/2-inch- square mesh, 0.063-inch wire.
b. Dampers: Manually operated, spring-loaded, vertically rising type; chain and worm gear operator; with chain of length required to reach within 36 inches above floor.
c. Throat Size: 9 or 12 inches, as standard with manufacturer, and as required to comply with ventilation requirements.

H. Louvers: Size and design indicated; self-framing and self-flashing. Fabricate welded frames from minimum 0.0428-inch- thick, metallic-coated steel sheet; finished to match metal wall panels. Form blades from 0.0329-inch- thick, metallic-coated steel sheet; folded or beaded at edges, set at an angle that excludes driving rains, and secured to frames by riveting or welding. Fabricate louvers with equal blade spacing to produce uniform appearance. Louver sub frames and flashings shall be galvanized and painted with a rust inhibitive coating to match the metal wall panel.

1. Blades: Fixed.
2. Free Area: Not less than 7.0 sq. ft. for 48-inch- wide by 48-inch- high louver.
3. Bird Screening: Galvanized steel, 1/2-inch- square mesh, 0.041-inch wire; with rewirable frames, removable and secured with clips, fabricated of same kind and form of metal and with same finish as for louvers.

a. Mounting: Interior face of louvers.

4. Vertical Mullions: Provide mullions at spacings recommended by manufacturer, or 72 inches o.c., whichever is less.

I. Roof Curbs: Fabricated from minimum 0.0428-inch- thick, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet pre-painted with coil coating; finished to match metal roof panels; with welded top box and bottom skirt, and integral full-length cricket; capable of withstanding indicated loads and of size and height indicated.

1. Curb Sub-framing: Minimum 0.0528-inch- thick, angle-, C-, or Z-shaped steel sheet.
2. Insulation: 1-inch- thick, rigid type.

J. Pipe Flashing: Pre-molded, EPDM pipe collar with flexible aluminum ring bonded to base.

2.14 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.15 SOURCE QUALITY CONTROL

A. Special Inspector: Owner will engage a qualified special inspector to perform the following tests and inspections and to submit reports. Special Inspector will verify that manufacturer maintains detailed fabrication and quality-control procedures and will review the completeness and adequacy of those procedures to perform the Work.

1. Special inspections will not be required if fabrication is performed by a manufacturer registered and approved by Authorities Having Jurisdiction to perform such Work without special inspection.

a. After fabrication, submit certificate of compliance with copy to Authorities Having Jurisdiction certifying that Work was performed according to Contract requirements.

B. Tests and Inspections:

1. Bolted Connections: Shop-bolted connections shall be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
2. Welded Connections: In addition to visual inspection, shop-welded connections shall be tested and inspected according to AWS D1.1 and the following inspection procedures, at inspector's option:

a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
c. Ultrasonic Inspection: ASTM E 164.
d. Radiographic Inspection: ASTM E 94.

C. Correct deficiencies in Work that test reports and inspections indicate do not comply with the Contract Documents.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

1. For the record, prepare written report, endorsed by Erector, listing conditions detrimental to performance of work.

B. Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with Erector present, for compliance with requirements and metal building system manufacturer's tolerances.

1. Engage land surveyor to perform surveying.

C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.

B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place, unless otherwise indicated.

3.3 ERECTION OF STRUCTURAL FRAMING

A. Erect metal building system according to manufacturer's written erection instructions and erection drawings.

B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.

C. Set structural framing accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

D. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.

F. Primary Framing and End Walls: Erect framing true to line, level, plumb, rigid, and secure. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist cure grout for not less than seven days after placement.

1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

    a. Joint Type: Snug tightened or pretensioned.

G. Secondary Framing: Erect framing true to line, level, plumb, rigid, and secure. Fasten secondary framing to primary framing using clips with field connections using non-high-strength bolts.

1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
2. Locate and space wall girts to suit openings such as doors.
3. Locate canopy framing as indicated.
4. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.

H. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.

1. Tighten rod and cable bracing to avoid sag.
2. Locate interior end-bay bracing only where indicated.
3. Bracing shall be designed by a licensed professional engineer to accommodate wind loading during erection.

I. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.

J. Erection Tolerances: Maintain erection tolerances of structural framing within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.4 METAL PANEL INSTALLATION, GENERAL

A. Examination: Examine primary and secondary framing to verify that structural panel support members and anchorages have been installed within alignment tolerances required by manufacturer.

1. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before metal panel installation.

B. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.

    a. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.

2. Install metal panels perpendicular to structural supports, unless otherwise indicated.
3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
4. Locate and space fastenings in uniform vertical and horizontal alignment.

5. Locate metal panel splices over, but not attached to, structural supports with end laps in alignment. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
6. Lap metal flashing over metal panels to allow moisture to run over and off the material.

C. Lap-Seam Metal Panels: Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or metal panels. Install screws in predrilled holes.

1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.

D. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

E. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal panel manufacturer.

1. Seal metal panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal panel manufacturer.

3.5 METAL ROOF PANEL INSTALLATION

A. General: Provide metal roof panels of full length from eave to ridge, unless otherwise indicated or restricted by shipping limitations.

1. Install ridge caps as metal roof panel work proceeds.
2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.

B. Field-Assembled, Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
4. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels for fasteners.

5. Provide metal closures at peaks rake edges rake walls and each side of ridge caps.

C. Metal Roof Panel Installation Tolerances: Shim and align metal roof panels within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 METAL WALL PANEL INSTALLATION

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.
2. Shim or otherwise plumb substrates receiving metal wall panels.
3. When two rows of metal panels are required, lap panels 4 inches minimum.
4. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.
5. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Predrill panels.
6. Flash and seal metal wall panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
7. Install screw fasteners in predrilled holes.
8. Install flashing and trim as metal wall panel work proceeds.
9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated, or if not indicated, as necessary for waterproofing.
10. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws.
11. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

B. Field-Assembled, Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.

1. Field-Insulated Assemblies: Install thermal insulation as specified. Install metal liner panels over insulation on interior side of girts at locations indicated. Fasten with exposed fasteners as recommended by manufacturer.

C. Installation Tolerances: Shim and align metal wall panels within installed tolerance of 1/4 inch in 20 feet, non-accumulative, on level, plumb, and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.7 TRANSLUCENT PANEL INSTALLATION

A. Translucent Panels: Attach translucent panels to structural framing with fasteners according to manufacturer's written instructions. Install panels perpendicular to

supports, unless otherwise indicated. Anchor translucent panels securely in place, with provisions for thermal and structural movement.

1. Provide end laps of not less than 6 inches and side laps of not less than 1-1/2-inch corrugations for metal roof panels.
2. Align horizontal laps with adjacent metal panels.
3. Seal intermediate end laps and side laps of translucent panels with translucent mastic.

3.8 METAL SOFFIT PANEL INSTALLATION

A. Provide metal soffit panels full width of soffits. Install panels perpendicular to support framing.

B. Flash and seal metal soffit panels with weather closures where panels meet walls and at perimeter of all openings.

3.9 THERMAL INSULATION INSTALLATION FOR FIELD-ASSEMBLED METAL PANELS

A. General: Install insulation concurrently with metal wall panel installation, in thickness indicated to cover entire wall, according to manufacturer's written instructions.

1. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.
2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
3. Install factory-laminated, vapor-retarder-faced blankets straight and true in one-piece lengths with both sets of facing tabs sealed to provide a complete vapor retarder.
4. Install blankets straight and true in one-piece lengths. Install vapor retarder over insulation with both sets of facing tabs sealed to provide a complete vapor retarder.

B. Blanket Roof Insulation: Comply with the following installation method:

1. Over-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing members. Install layer of filler insulation over first layer to fill space formed by metal roof panel standoffs. Hold in place by panels fastened to standoffs.
2. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
3. Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks.

C. Blanket Wall Insulation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing members. Hold in place by metal wall panels fastened to secondary framing.

1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

D. Replace torn, cut, or ripped insulation panels, use new undamaged panels.

E. Install insulation panels to match the metal building exterior at the hangar door.

3.10 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Install components for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
3. Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

C. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 4 feet o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

D. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.

1. Tie downspouts to underground drainage system indicated.

E. Continuous Roof Ventilators: Set ventilators complete with necessary hardware, anchors, dampers, weather guards, rain caps, and equipment supports. Join sections with splice plates and end-cap skirt assemblies where required to achieve indicated length. Install preformed filler strips at base to seal ventilator to metal roof panels.

F. Louvers: Locate and place louver units level, plumb, and at indicated alignment with adjacent work.

1. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
2. Provide perimeter reveals and openings of uniform width for sealants and joint fillers.
3. Protect galvanized- and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.
4. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Division 7 Section "Caulking and Sealants" for sealants applied during louver installation.

G. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform the following tests and inspections and to submit reports.

B. Special Inspector: Owner will engage a qualified special inspector to perform the following tests and inspections and to submit reports.

C. Tests and Inspections:

1. High-Strength, Field-Bolted Connections: Connections shall be tested and inspected during installation according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
2. Welded Connections: In addition to visual inspection, field-welded connections shall be tested and inspected according to AWS D1.1 and the following inspection procedures, at inspector's option:

a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
c. Ultrasonic Inspection: ASTM E 164.
d. Radiographic Inspection: ASTM E 94.

D. Correct deficiencies in Work that test reports and inspections indicate do not comply with the Contract Documents.

3.12 ADJUSTING

A. Doors: After completing installation, test and adjust doors to operate easily, free of warp, twist, or distortion.

B. Door Hardware: Adjust and check each operating item of door hardware and each door to ensure proper operation and function of every unit. Replace units that cannot be adjusted to operate as intended.

1. Door Closers: Adjust door closers to compensate for final operation of heating and ventilating equipment. Adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

2. Refer to Section “Metal Doors and Frames” for additional requirements.

3.13 CLEANING AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

C. Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates, and accessories.

1. Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or SSPC-SP 3, "Power Tool Cleaning."
2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

D. Touchup Painting: Cleaning and touchup painting are specified in Division 9 painting Sections.

E. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

1. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

F. Doors and Frames: Immediately after installation, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

1. Immediately before final inspection, remove protective wrappings from doors and frames.

G. Louvers: Clean exposed surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.

1. Restore louvers damaged during installation and construction period so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

a. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 13341

SECTION 02361 – TERMITE CONTROL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Furnish and apply soil treatment with termiticide as indicated on the Drawings and specified herein.

B. Provide soil treatment at all new slab-on-grade areas within the interior of building.

1.3 QUALIFICATIONS

A. This Contractor shall be a licensed termite control operator and shall have as part of his organization a professional entomologist.

1.4 DELIVERY

A. Chemicals shall be delivered to the Project site in a transport equipped with a gauge capable of indicating the correct number of gallons being applied to required areas.

1.5 SUBMITTALS

A. Submittals shall comply with Section 01330 – Submittal Procedures.

B. Submit certifications for applicator qualifications and gauge readings of applications.

C. Submit product data including the following:

1. Working solution to be used and manufacturer's printed data.
2. The color of dye to be used.
3. Working solution to be mixed in accordance with Bureau of Entomology, State of Florida Board of Health and EPA.

D. Submit sample form of warranty per Article 1.6 of this Section.

E. Furnish an applicator’s “Certificate of Protective Treatment for Prevention of Termites” upon completion of all required FBC treatments and prior to slab-on-grade placement and provide a second copy with the project closeout documents.

1.6 WARRANTY

A. Upon completion of the work, and as a condition of Final Acceptance, Owner shall be furnished with a written warranty stipulating that termiticide treatment shall prevent subterranean termites from attacking and damaging the building or its contents for a period of not less than 5 years, starting from date of Substantial Completion of the building.

B. If subterranean termite activity exists in or under the building during the warranty period, the Contractor promptly, and without expense to the Owner, shall:

1. Retreat the soil to prevent subterranean termites from attacking the building or its contents, using means acceptable to the Owner.
2. Make good all damage caused by subterranean termite activity, up to Ten Thousand Dollars ($10,000.00).
3. The warranty shall be written in favor of the Owner. A specimen of the form of warranty shall be submitted to the Architect for review prior to commencement of work.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Working solutions shall be based on any of the following termiticides in the strength indicated and meeting approval of all Federal, State and Local Regulatory agencies:

1. “Altriset”; Syngenta.

B. Dye, of any type, such as Blazon by Milliken Chemicals, not chemically harmful to termiticide emulsions and red or blue in color shall be added to solution before application.

C. Solution shall be mixed in strict accordance with spray solution chart as prepared by the Bureau of Entomology, State of Florida Board of Health and EPA.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

A. Termiticides shall be applied by experienced skilled mechanics and in the best workmanlike manner of this trade.

B. Termite control shall not begin until all the subgrade soil preparation work has been completed and made ready for the vapor barrier installation.

C. Termiticides shall not be applied when soil is excessively wet as determined by the Owner’s Testing Laboratory.

3.2 APPLICATION

A. Application for emulsion shall be applied as follows, but in NO CASE less than the manufacturer's printed directions for use for preconstruction treatment.

B. Horizontal Barriers: Termiticides shall be applied uniformly to all areas that will be covered by concrete slabs, including beneath sidewalks and entrance platforms adjacent to the building.

1. To produce a horizontal barrier, apply the emulsion at the rate of 1 gallon per 10 square feet of backfill.
2. If the backfill is washed gravel or other course material, apply at 1-1/2 gallons per 10 square feet.
3. At critical areas such as along the inside of foundation walls, around plumbing, utility services, and other features that will penetrate the concrete slab(s), apply emulsion at 2 gallons of solution per 5 linear feet to soil.
4. Applications shall be made with pressures less than 50 psi at the nozzle, using a course spray nozzle.
5. If concrete slabs cannot be poured over soil the same day it has been treated, a waterproof cover shall be placed over the soil to prevent erosion.

C. Vertical Barriers: Vertical barriers shall be established in soil which will be under the perimeters of floating or supported slabs, around utilities and in other critical areas which will be covered by concrete. After the final exterior grading is completed, vertical barriers shall be created in backfilled soil against foundation walls or against the outside of monolithic slab.

1. To produce a vertical barrier, apply the emulsion at the rate of 4 gallons per 10 linear feet of depth from grade to the top of the footing.
2. In hollow concrete masonry unit voids, apply emulsion at the rate of 2 gallons per 10 linear feet.

D. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities.

END OF SECTION 02361

SECTION 02660

POTABLE WATER SYSTEM

02660-1 General

02660-1.1 Work Included.

A. Furnish all labor, materials and equipment necessary to provide water mains and appurtenances for potable and fire service.

02660-1.2 Installer's Qualifications.

A. The Concessionaire shall have a valid certified underground utility contractor's license, certified by the State Fire Marshal for installation of Fire Protection Systems and having at least three years of successful installation experience of potable water piping.

02660-1.3 Requirements of Regulatory Agencies.

A. All work is subject to FDOT Standards, Florida DEP Regulations, Florida Building Code and local utility agency regulations.

B. All utility construction shall be in conformance with the local utility agency standards and the Florida Department of Environmental Protection State Standards for Utility Construction.

C. Fire service lines shall be constructed and inspected in accordance with the regulations of the State Fire Marshal's Office.

02660-1.4 Reference Standards.

ASTM D 2241 Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).

AWWA C111 Standard for Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.

AWWA C508 Standard for Swing-Check Valves for Waterworks Service, 2 inch through 24 inch NPS.

AWWA C509 Standard for Resilient-Seated Gate Valves for Water and Sewerage Systems.

AWWA C600 Standard for Installation of Ductile-Iron Water Mains and Appurtenances.

AWWA C605 Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.

AWWA C651 Standard for Disinfecting Water Mains.

AWWA M23 PVC Pipe - Design and Installation.

02660-1.5 Submittals.

A. Submit manufacturer's technical product data and installation instructions for potable water system materials and products.

B. Submit shop drawings for potable water systems, showing piping materials, sizes, layout and elevations. Include details of underground structures, connections, thrust blocks, and anchors. Show interface and spatial relationship between piping and proximate structures.

C. Submit maintenance data and parts lists for potable water system materials and products. Include this data, product data, shop drawings, and record drawings in maintenance manual.

02660-2 Products.

02660-2.1 Markings.

A. All water mains shall have a blue marker tape buried 24 inches above the top of the pipe for its entire length.

B. A blue coated #14 gauge UF (Underground Feeder per National Electric Code Article 339) solid tracer wire and joint seal (Kearney Aquaseal or Bishop) shall be installed along all pipe and service and must be taped below the spring line of the pipe and stubbed up at hydrants and valves.

02660-2.2 Ductile Pipe and Fittings.

A. Ductile Iron Pipe: Ductile iron pipe shall conform to the requirements of ANSI, A 21.51 and AWWA C151, latest revision. The pipe shall have a minimum rated water working pressure of 250 psi for diameters 4 inches through 12 inches and shall be furnished in nominal laying lengths of 20 feet or less. Flanged pipe shall have a minimum thickness class of Class 53.

B. Lining and Coatings:

1. Interior Lining for Potable, and Non-Potable Reuse Water Piping: Ductile iron pipe, fittings and specials shall be cement lined in accordance with ANSI/AWWA C 104, Cement-Mortar Lining for Ductile Iron and Gray Iron Pipe and Fittings for Water. The cement lining shall have standard thickness and, after curing, the lining shall have a seal coat of bituminous material.

2. Exterior Coatings for Buried Pipe: Ductile iron pipe, fittings and specials to be installed underground shall be coated on exterior at the factory with an asphaltic coating as specified in AWWA C 151. All clamps, bolts, nuts, studs and other uncoated parts of joints for underground installation shall be coated with coal tar epoxy prior to backfilling. Coal tar epoxy shall be equal to Kop-Coat Bitumastic No.300-M.

3. Exterior Coating for Exposed Pipe: Ductile iron pipe, fittings and specials to be installed aboveground shall be furnished with a shop applied primer on the exterior.

C. Fittings: Fittings for ductile iron pipe shall be either mechanical joint, restrained joint or flanged joint as indicated on the Drawings and shall have a minimum working pressure of 250 psi. Fittings shall be ductile iron and shall conform to ANSI/AWWA C 110, ANSI/AWWA C 111 and ANSI/AWWA C 153, latest revisions for flanged and mechanical joint pipe. Fittings shall be coated and lined as specified above for ductile iron pipe. The rubber gaskets for flanged, mechanical, and push-on joints shall be as described below.

D. Push-On Joints: Pipe using push-on joints shall be in strict accordance with AWWA C 111 and ANS1 A 21.11, latest revision and shall be as manufactured by American Cast Iron Pipe Company (Fastite Joint), United States Pipe Company (Tyton Joint), or Clow Corporation (Super Bell Tite Joint). Jointing materials shall be provided by the pipe manufacturer and installation shall be in strict accordance with the manufacturer's recommended practice.

E. Mechanical Joints: Jointing materials for mechanical joints shall be provided by the pipe and fitting manufacturer. Materials assembly and bolting shall be in strict accordance with ANSI/AWWA C 111 and ANSI/AWWA C 153, latest revisions. Tee head bolts and nuts for mechanical joints shall be manufactured of CORTEN, high strength, low alloy, corrosion resistant steel as manufactured by NSS Industries, or equal.

F. Flanged Joints: Flange drillings shall be Class 125 per ANSI B 16.1 with any special drilling and tapping as required to insure correct alignment and bolting.

1. Gaskets: Full face 1/8-inch thick, cloth-inserted rubber: Johns-Manville No. 109, John Crane Co., Style 777, or equal. Gaskets shall be suitable for a water pressure of 350 psi at a temperature of 180°F.

2. Bolts and Nuts for Flanges:

a. Bolts and nuts for flange located indoors and in enclosed vaults and structures shall be carbon steel, ASTM A307, Grade B.

b. Bolts and nuts for buried and submerged flanges and flanges located in wet wells, and manholes shall be Type 316 stainless steel conforming to ASTM A193, Grade B8M for bolts, and ASTM A194, Grade 8M for nuts.

3. Flanges shall be long-hub type screwed tightly on pipe by machine at the foundry prior to facing and drilling. Flange machine surfaces shall be coated with rust inhibitor immediately after facing and drilling. Field assembled screwed on flanges are prohibited.

G. Restrained Joints: Restrained joints shall be provided for all buried piping systems as indicated on the Drawings to restrain system thrust. Pipe joints and fittings shall be restrained as specified below.

1. Manufactured Restrained Joints: Manufactured restrained joints shall be Flex-Ring, Lok-Ring, Lok-Fast or Fast Grip, manufactured by the American Cast Iron Pipe Company, Lok-Type or Tr-Flex Type, manufactured by the United States Pipe Company or an equal approved by the Department. Joints shall be manufacturer's standard specifically modified push-on type joints with joint restraint provided by ductile iron retainer rings joined together by corrosion resistant, high strength steel tee head bolts and nuts or with joint restraint provided by a welded-on retainer ring and a split flexible ring assembled behind the retainer ring.

2. Restrained joint pipe and fittings shall be ductile iron only and shall comply with applicable portions of this specification. Manufactured restrained joints shall be capable of deflection during assembly. Deflection shall not exceed 80 percent of the manufacturer's recommendations.

3. Tee head bolts and nuts for restrained joints shall be manufactured of CORTEN, high strength, low alloy, corrosion resistant steel as manufactured by NSS Industries, or equal.

H. Alternate Restrained Joints: When prior approval is obtained from the Department, ductile iron pipe and fittings with mechanical joints may be restrained using a follower gland which includes a restraining mechanism. When actuated during installation, the restraining device

shall impart multiple wedging action against the pipe wall which increases resistance as internal pressure in the pipeline increases.

1. The joint shall maintain flexibility after installation. Glands shall be manufactured of ductile iron conforming to ASTM A536 and restraining devices shall be of heat-treated ductile iron with a minimum hardness of 370 BHN. The gland shall have standard dimension and bolting patterns for mechanical joints conforming to ANSI/AWWA C 111 and C 153, latest revisions.

2. Tee head bolts and nuts shall be manufactured of corrosion resistant, high strength, low alloy CORTEN steel in accordance with ASTM A242.

3. The restraining wedges shall have twist-off nuts to insure proper torquing. The mechanical joint restraint device shall have a minimum working pressure rating of

I. 250 psi with a minimum safety factor of 2 to 1 and shall be MEGALUG^{R} as manufactured by EBAA Iron, Inc. No other retainer gland type device will be acceptable. After installation prior to backfilling, all parts of the joint restraint system shall be coated with coal tar epoxy equal to Kop-Coat Bitumastic No. 300-M.

J. Identification: All buried piping shall receive a color-coded adhesive identification tape.

02660-2.3 PVC Pipe and Fittings.

A. Small PVC Pressure Piping: Unless otherwise specified, PVC pressure pipe smaller than 4 inches nominal diameter shall be Schedule 80 PVC in accordance with ASTM D 1785. Schedule 80 pipe shall have either solvent welded or threaded joints. PVC pressure pipe shall bear the approved seal of the National Sanitary Foundation (NSF). PVC pipe that is exposed to sunlight shall be manufactured with additives to provide resistance to ultraviolet deterioration.

1. Fittings: Socket type, solvent welded fittings for Schedule 80 PVC pipe shall be in conformance with ASTM D2467. Threaded type fittings for Schedule 80 PVC pipe shall be in conformance with ASTM D2464.

2. Flanges: Flanges for Schedule 80 PVC pipe shall be rated for a 150 psi working pressure with ANSI B 16.1 dimensions and bolting pattern. Flanges shall be connected to PVC piping with either solvent welded or threaded joints in accordance with ASTM D2467 or ASTM D2464, respectively. Gaskets shall be full faced type with a minimum thickness of 1/8 inch. Nuts and bolts shall be hexagonal with machine threads, manufactured of Type 316 stainless steel in accordance with ASTM A320, Class 2. Type 316 stainless steel flat washers with lock washers shall be used against PVC flanges.

3. Solvent Cement: As recommended by pipe manufacturer and in compliance with ASTM D2564.

4. Thread Lubricant: Plastic pipe dope as recommended by the pipe manufacturer, or Teflon tape.

B. Large PVC Pressure Piping: Unless otherwise noted, for diameters 4 to 12 inches use AWWA C 900 pipe with a dimension ratio of DR18, pressure class of 150 psi, and for larger than 12 inches use AWWA C 905 pipe with a dimension ratio of DR18, pressure class

of235 psi. Pipe shall be designed with not less than a 4 to 1 sustained hydrostatic pressure safety factor. Fittings shall be ductile iron fittings with restrained mechanical joint ends as specified hereinbefore. Pipe dimensions shall be made to match ductile iron pipe O.D.'s.

Pipe joints shall be made with integral bell and spigot pipe ends. The bell shall consist of an integral thickened wall section designed to be at least as strong as the pipe wall. The bell shall be supplied with factory glued rubber ring gasket that conforms to the manufacturer's standard dimensions and tolerances. The gasket shall meet the requirements of ASTM F477 Elastomeric Seals (Gaskets) for Joining Plastic Pipe. PVC joints shall be "Ring-Tite" as manufactured by J-M Manufacturing Company, Inc. or equal.

C. Identification: All buried piping shall receive a color-coded adhesive identification tape.

02660-2.4 PVC Ball and Check Valves.

A. PVC Ball Valves: All PVC ball valves 1/2 inch through 4 inches in size shall be of a one piece capsule type manufactured of Type 1, Grade 1 PVC. Ball valves shall be true union design with two-way blocking capability and shall have solvent welded socket or NPT threaded ends. Ball valves shall have Teflon seats with Viton backing cushions and Viton O-ring seals, and shall be designed for a 150 psi water working pressure at 120°F. Valves shall be supplied with ABS lever operating handles. PVC ball valves shall be manufactured by Asahi/America, or an equal approved by the Department.

02660-2.5 Gate Valves.

A. Bronze Gate Valves: Gate valves installed aboveground, 2 inches in size and smaller, shall be Class 150 all bronze valves conforming to Fed. Spec. WW-V-54d, Type I, Class B designed for a non-shock water pressure of 300 psi. Valves shall be furnished with screwed ends, handwheel operator, non-rising stem, one-piece solid wedge disc and screwed bonnet and shall be as manufactured by Crane, Powell or equal. The minimum weight of valves shall be as follows:

Valve Size (Inches)	Valve Weight (Pounds)
½	1.0
¾	1.5
1	2.5
1 ¼	3.6
1 ½	4.6
2	7.6

B. Iron Gate Valves:
   1. Iron gate valves shall open by turning to the left (counter-clock-wise), when viewed from the stem. When fully open, gate valves shall have a clear waterway equal to the nominal diameter of the pipe. Operating nut or hand wheel shall have an arrow cast in the metal indicating the direction of opening. Each valve shall have the manufacturer's distinctive marking, pressure rating and year of manufacture cast on the body. Prior to shipment from the factory, each valve shall be tested by applying to it a hydrostatic pressure equal to twice the specified working pressure. Hydrostatic and leakage tests shall be conducted in accordance with ANSI/AWWA C 500 or ANSI/AWWA C 509, latest revisions, whichever is applicable.

   2. Gate valves with nominal sizes from 2 to 2-1/2 inches shall conform to ANSI/AWWA C 500, latest revision, and shall be designed for a minimum working pressure of 200 psi.

Valves shall be iron body, bronze-mounted, double disc, parallel seat, non-rising stem type with double, Buna-N, O-ring stem seals. Bronze items of construction shall include the stems, seat rings, stem nuts, wedge bushings and upper and lower wedges. Bronze used for construction of these items shall be low zinc alloy bronze. Valve ends shall be screwed and as specified for steel pipe and fittings. Interior ferrous surfaces of valve, except for finished or bearing surfaces, shall be coated with a fusion bonded or thermo-setting epoxy coating in accordance with AWWA C 550, latest revision. Coating shall be holiday-free, NSF approved, with a minimum thickness of 12 mils. Surfaces shall be clean, dry, and free from rust and grease before coating. Exterior surfaces shall be coated as specified hereinafter.

Gate valves for this size range shall be as manufactured by American-Flow Control, Kennedy Valve Manufacturing Company, Dresser Industries, Inc., or equal.

3. Gate valves with nominal sizes from 3 to 16 inches shall conform to ANSI/AWWA C509, latest revision, and shall be designed for a minimum working pressure of 200 psi. Valves shall be iron body resilient seat type with O-ring stem seals. The valve stem, stem nut, glands and bushings shall be bronze. Valve disc shall be constructed to assure uniform seating pressure between disc seat ring and body seating surface. Resilient seat of valve shall be formed by a special corrosion and chloramine resistant, synthetic elastomer which is permanently bonded to and completely encapsulates a cast iron valve disc.

   Valve ends for underground installation shall be mechanical joint as specified for ductile iron pipe and flanged for above ground valves. Interior of valve body shall be coated with a fusion bonded or thermo-setting epoxy coating in accordance with AWWA C 550, latest revision. Coating shall be holiday-free, NSF approved, with a minimum thickness of 12 mils. Surfaces shall be clean, dry and free from rust and grease before coating. Exterior surfaces shall be coated as specified hereinafter. Resilient-seated type gate valves shall be manufactured by M & H Valve Company, U.S. Pipe Company, or equal.

4. Valve Joints: All gate valves shall have either mechanical joint, restrained joint or flanged ends to fit the pipe run in which they are to be used. Gate valves installed on push-on joint pipe shall have mechanical joint ends unless otherwise specified.

5. Valve Operators: Unless otherwise shown on the Drawings or specified herein, gate valves shall have non-rising stems. Buried gate valves shall be furnished with a 2-inch square AWWA standard nut operator with a valve box and cover. Gate valves located aboveground or inside structures shall be furnished with a handwheel operator which shall have an arrow cast in the metal indicating the direction of opening. 16-inch gate valves shall be equipped with gearing with a 2:1 gear ratio. All aboveground gate valves shall be of the open screw and yoke (OS&Y) gear operator design with a handwheel operator. All below ground 16-inch valves shall have bevel gear operators.

6. Exterior Valve Coatings: All exterior surfaces of iron body gate valves shall be clean, dry and free from rust and grease before coating. For buried service, the exterior ferrous parts of all valves shall be coated at the factory with coal tar epoxy with a minimum total finish dry film thickness of 20 mils. Prior to back- filling, all uncoated nuts, bolts, glands, rods and other parts of joints shall be coated in the field with coal tar epoxy equal to Kop-Coat Bitumastic No. 300-M. For valves installed aboveground, the exterior ferrous parts of all valves shall be shop primed at the factory with one coat,

minimum dry film thickness 2 - 3.5 mils, of a lead and chromate- free primer with rust-inhibitive pigments and synthetic resins. Primer shall be suitable for finish paint specified. Following installation, aboveground valves shall be finish painted.

02660-2.6 Air Release Valves (Clean Water Service).

A. Large Valves: Valves 1 inch or larger shall have heavy duty compound lever operating mechanism with 316 stainless steel pivot pins and 316 stainless steel retaining rings. Valves shall be constructed of cast iron ASTM A 48, Class 35 with 316 stainless steel trim and float. Valves shall have an adjustable orifice button, constructed of 316 stainless steel with viton or Buna-N seating. Provide 1/2-inch threaded outlet and stainless-steel plug for top cover and body drain. Valves shall have a working pressure rating of at least 150 psi. Valves shall be APCO Model 200A, or as manufactured by Valmatic, or equal.

B. Valve End Connections:
   1. Valves smaller than 3 inches shall have threaded ends. Valves 4 inches or larger shall have flanged ends.

   2. Flanges for Class 150 valves shall comply with ANSI B 16.1, Class 125. Flanges for Class 300 valves shall comply with ANSI B 16.1, Class 250.

   3. Threaded ends shall comply with ANSI B2.1

C. All air release and vacuum release valves shall be isolated from the service line with a 316 stainless steel gate valve for valves up to 3 inches, and a flanged body butterfly valve for valves greater than3 inches (provide a spacer plate if required to clear the rotation of the butterfly disc).

D. The open end of the automatic air release valve installed on potable water main shall be extended to at least one foot above grade and provided with a 20 mesh non-corrodible screen on the outlet of the downward facing elbow.

02660-2.7 Fire Hydrants.

A. Fire hydrants shall be general service type, ductile iron body, fully bronze mounted, for 150 psi working pressure, complying with AWWA Standard C 502, latest revision. The inlet connection shall be mechanical joint type, with accessories, for 6-inch ductile iron pipe. The hydrant foot shall have integral cast tie-back lugs. The integral shut-off valve shall be compression type opening against water pressure, and shall open left (counter-clockwise) as viewed from the operating nut.

B. The main hydrant valve opening shall be 5-1/4 inches. Valve diameter and general interior design shall be sufficient to provide head loss/flow quantity ratios less than specified in the above cited standard. The main valve seat and the threaded portion of the hydrant into which it screws shall be bronze. The hydrant barrel drain valve and port shall be bronze. The hydrant barrel drain shall be actuated by the main valve stem. The drain washer for the drain valve shall be Buna-N rubber which shall provide positive sealing action when the valve is opened. The stem operating threads and thrust bearing, and bronze seat ring threads shall be sealed by replaceable O-rings to protect from moisture and corrosion. Stem and seat ring threads shall be permanently greased lubricated or provided with a means for lubrication. All interior working parts of the hydrant shall be removable from the top of the hydrant to allow for repairs without removing the hydrant barrel after it has been installed. A weather shield shall be provided on the bonnet to protect the operating nut and lock nut area from dirt and water.

C. The hose nozzles shall be bronze with American National Standard fire hose coupling screw threads, one 4-1/2 inch pumper nozzle and two 2-1/2 inch hose nozzles. The hydrant operating nut and nozzle cap nuts shall be the same standard size and shape as specified by the local fire district. Nozzle caps shall be securely chained to hydrant barrel. Chains shall be corrosion resistant and painted to match hydrant color. The hydrants shall be "traffic" type with a frangible flange or lugs and operating stem section at ground line.

D. Hydrants shall be furnished with a 3 foot bury body except where deeper burial depths are indicated on the plans.

E. Coatings For Fire Hydrants: All ferrous metal surfaces of the hydrants shall be clean, dry and free from grease before coating as follows:

1. All exposed exterior surfaces below the ground line shall be coated at the factory with coal tar epoxy equal to Kop-Coat Bitumastic No. 300-M, for a minimum total finish dry film thickness of 20 mils.

2. All exposed interior surfaces above and below the main hydrant valve, except non-ferrous and machined ferrous surfaces shall be coated at the factory with a fusion bonded or thermosetting epoxy coating in accordance with AWWA C 550, latest revision. Coating shall be holiday free, NSF approved, with a minimum thickness of 12 mils.

3. All exposed, exterior, aboveground ferrous metal surfaces including barrel, bonnet, nozzle caps, nozzle cap chains, nuts, bolts and other fasteners shall be coated at the factory. Shop prime with one coat, 2 - 3.5 mils dry film thickness of a lead and chromate-free, rust inhibitive resin primer. Primer shall be compatible with finish coating specified. Finish coating shall be applied in accordance with the coating manufacturer's recommendations. Finish coating shall be Kop-Coat Rustarmor 500, or equal. Color of the finish coating shall be as required by the local fire district.

F. Approved Fire Hydrants: Fire hydrants shall be supplied from one manufacturer for the Project. The fire hydrants supplied shall be for general service type fire hydrants and shall be American Model B-84 B. Kennedy Model K81A Guardian; Mueller Model Centurion A-423; or equal.

G. Auxiliary Gate Valve: Auxiliary gate valve furnished with each hydrant shall be a 6 inch non-rising stem, resilient seated gate valve with mechanical joint ends and a cast iron valve box in conformance with the specifications in this Section.

02660-2.8 Wet Tapping Sleeves and Valves.

A. Wet Tapping Sleeves: Cast iron, mechanical joint type, with working pressure rating of 200 psi for sizes 4 through 12 inches and 150 psi for sizes 14 inches and larger, conforming to the applicable provisions of AWWA C110. Sleeve and glands shall be split type for assembly on pipe, and sleeve and mechanical joint glands and gaskets shall be sized for use with the class and type of pipe being tapped. Sleeve and glands shall be factory coated on interior and exterior with a fusion bonded, thermosetting epoxy coating in accordance with AWWA C550, current revision. Coating shall be holiday free with a minimum thickness of 12 mils DFT, and shall be furnished complete with all accessories. Outlet flange shall be Class 125 Standard. Tapping sleeves shall be as manufactured by the Mueller Company, American Valve and Hydrant Company, Kennedy Valve, or equal. Prior to backfilling, all uncoated exterior nuts, bolts, glands, rods and other parts of sleeve shall be coated in the field with coal tar epoxy to Kop-Coat Bitumastic No. 300-M.

B. Wet Tapping Valves: Tapping valves shall conform to ANSI/AWWA C509, and shall be designed for a minimum working pressure of 200 psi. Tapping valves 3 to 16 inches in size shall be resilient seat type gate valves as specified hereinbefore for gate valves 3 to 16 inches in size. Resilient seat type tapping valves shall be furnished with a raised guide ring cast integrally on the flanged end which is designed to match the groove in the tapping sleeve in accordance with MSS-SP60. The purpose of this guide ring shall be to ensure true alignment of the valve with the tapping sleeve. The interior of the waterway in the valve body shall be a full opening and capable of passing a full sized shell cutter equal to the nominal diameter of the valve. Tapping valves shall be as manufactured by the M & H Valve Company, U.S. Pipe Company, or equal.

02660-2.9 Valve Boxes.

A. Boxes shall be cast iron of standard design with adjustable screw type box. Interior diameter shall not be less than 5 inches with cast iron cover marked "WATER". Any deviations must have approval prior to installation.

02660-2.10 Corporation Stops and Service Paddles.

A. Corporation stops shall be Mueller Co. Type H-15000 for 1-inch service and Type H-10003 for 2-inch service or equal.

B. Corporation stops shall be Ford Meter Box Co. Type F-1000, Mueller co. Type H-15009 or equal with inlet having AWWA tapered threads and outlet for polyethylene or copper tubing with stainless steel insert stiffener.

C. Service Saddles: saddles shall have ductile iron bodies in accordance with ASTM A 536, latest revision, with double stainless-steel straps. Ductile iron body shall have a fusion bonded nylon coating with a minimum thickness of 12 mils. Straps shall be Type 304 stainless steel with premium grade Type 304 L stainless steel bolts and Type 304 stainless steel washers and nuts. The nuts shall be Teflon coated. The gasket material shall be an elastomeric compound resistant to degradation by oil, natural gas, acids, alkalies, most aliphatic fluids and chloramines. The outlet of the saddle shall have NPT threads. Service saddles shall be smith Blair No. 317 or equal.

02660-2.11 Double Check Back Flow Preventers.

A. Standards of Construction: Back flow prevention devices shall be manufactured in accordance with AWWA C 510, latest revision, American Society of Sanitary Engineering Standards, and the University of Southern California Foundation for Cross Connection Control and Hydraulic Research "Manual of Cross Connection Control", Sixth Edition.

B. Product Handling: Exercise care in transporting and handling back flow preventers to avoid damage. Inside of back flow preventers shall be kept free of dirt and debris.

C. Double check valve back flow preventers shall include independent spring-loaded check valves that remain closed until there is a demand for water. Each of the two check valves in series is designed to open at 1 psi pressure differential in the direction of flow. In the event pressure increases downstream of the unit, tending to reverse direction of flow, both check valves are closed to prevent backflow. If the second check valve is prevented from closing tightly, the first check valve will still provide protection from a backflow condition.

D. Double check valve back flow preventers shall have all bronze bodies for sizes 2 1/2 inches and smaller and all ductile iron bodies for sizes 3 inch and larger. Ductile iron bodies shall be coated with a fusion bonded thermosetting epoxy coating in accordance with AWWA C550 with a minimum, holiday-free, coating thickness of 12 mils. The double check

valve back flow preventer shall consist of two independently operated, spring loaded, wye pattern, poppet type check valves designed for installation in a normal horizontal flow attitude. Check valve assemblies, springs and seats, and all other internal parts shall be constructed of Type 316 stainless steel. Check valve seats shall be field replaceable without removing the device from the service line. Back flow preventers shall be designed for a working pressure of 200 psi and a temperature range of 32°F to 140°F. The back-flow preventer shall be manufactured as a complete unit including test cocks, and upstream and downstream isolation gate valves. The test cocks shall be manufactured of bronze and shall be arranged such that the unit can be tested without removing the unit from the line.

E. Isolation Valves: Double check valve back flow preventers shall be furnished complete with isolation valves. For sizes 2-1/2 inches and smaller, the isolation valves shall be all bronze ball valves with Buna N O-rings and valve seats, and a lever operating handle. Ball valves shall be in accordance with AWWA C 800, latest revision. For sizes larger than 3 inches, the isolation valves shall be resilient seated gate valves with flanged ends and OS&Y handwheel operators. Gate valves shall be as specified and described hereinbefore.

F. Exterior Coating: The exterior ferrous surfaces of the double check valve back flow preventer and the isolation valves shall be shop primed and finish painted at the factory.

G. Acceptable Manufacturers: Double check valve back flow preventers shall be Model No. 2 as manufactured by Hersey Products, Inc., Model 805 YD as manufactured by Febco, Model 709 as manufactured by Watts Regulator Company or an equal approved by the Department.

02660-2.12 Water Meter.

A. Water meters shall be standard local utility agency meters. The Concessionaire is responsible for the cost of the meter and installation, as well as impact fees, connection charges and all costs associated with providing fire and potable water to the facility.

02660-2.13 Water Meter Box.

A. Install meter boxes flush to proposed grade. All meter boxes shall meet H-20 traffic loads as established by AASHTO. Meter boxes shall be constructed of a composite material of polymer concrete and fiberglass. Meter boxes shall be manufactured by CDR Systems Corporation or equal.

02660-3 Execution.

02660-3.1 Pipe Installation.

A. Installation shall be performed in accordance with the applicable provisions of AWWA.

B. Restrained joints shall be required at all bends and tees.

C. Install underground marker at all locations where piping is installed.

D. All pipes shall be installed 36 inch (minimum) below unpaved ground and 48 inch (minimum) below pavement surfaces within limited access right-of-way as shown on the Plans.

02660-3.2 Backfilling.

A. Provide a well compacted bed for the pipe and carefully fill and compact along the sides of the pipe in 6-inch layers to a point at least 1 foot over the top of the pipe. Where no pavement is to be constructed and vehicular traffic is to pass over the pipe, such as road

shoulder and grass median strip areas, backfill material above 1 foot over the top of the pipe shall be compacted to a firmness approximately equal to that of the soil adjacent to the pipe trench excavation.

B. When pavement is to be constructed over the pipe, backfill material above 1 foot over the top of the pipe shall be placed in a manner and compacted to a degree required to meet the minimum FDOT requirements for compaction.

C. The Department reserves the right to reject any portion of backfill material that is not deemed appropriate or improperly placed. The Concessionaire will be required to reopen the trench at those locations and replace backfill in a proper manner.

02660-3.3 Installation of Double Check Valve Backflow Preventers.

A. Back flow preventers shall be installed in accordance with the manufacturer's written installation instructions.

B. Back flow preventers shall be installed horizontally with 18 inches minimum clearance between the finished grade and the lowest point on the bottom of the unit. Back flow preventers shall be installed with provisions for a suitable drain arrangement to drain off discharges from the relief valve, so that discharges are not objectionable. Back flow preventers shall be installed such that they are easily accessible for testing, maintenance and repair.

C. Piping and fittings for units 3 inch and larger in size shall have flanged joints. Piping, fittings and valves for units 3 inch and larger in size shall be properly supported with adjustable pipe support stands.

02660-3.4 Pressure Tests.

A. After installation is completed, system testing shall be coordinated with the local utility agency. The system shall be filled with water and flushed at the highest obtainable velocity at the farthest points. All air must be expelled and if the system appears to be tight, the leakage test may begin. All connections and pipe for fire service must be flushed prior to entering the structure. No flushing is to take place through the backflow preventer. Pipelines shall be pumped to pressure equal or greater than 150 psi . Should pressure fall below the starting pressure, +/- 5 psi during the test period, it shall be voided and restarted. Test period shall be for two hours unless otherwise specified.

B. Pressure testing shall be performed in accordance with AWWA Manual M23 for PVC pipe and C600 for DIP.

C. All leaks shall be uncovered and repaired regardless of the total leakage as indicated by the test, and all pipes, valves, and fittings and other materials found defective under the test shall be removed and/or replaced as necessary until leakage has been eliminated and the system passes a pressure test.

02660-3.5 Sterilization Test.

A. Sterilization of all equipment, pipelines, and other parts of the water piping system shall be accomplished after completion of construction and immediately before the system is placed into operation. The Concessionaire shall provide all water used for construction and sterilization of the system.

B. Sterilization shall be conducted in accordance with Health Department requirements.

C. The sterilizing agent shall be liquid chloride or sodium hypochlorite solution conforming to Federal Specification 0-S-602b Sodium Hypochlorite, Grade D. Dry Hypochlorite similar to "HTH" may also be used as the sterilizing agent, upon approval by the Department.

D. The piping shall be sterilized by introducing the sterilizing agent into the water which is being pumped into the system in such a manner that the entire system will be filled with water containing a minimum chlorine concentration of 50 ppm at any point. This water shall be allowed to remain in the system for a contact period of time of at least 24 hours.

E. After sterilizing agents have been permitted to remain for the specified contact periods, the pipeline and valves shall be thoroughly flushed with water until the residual chlorine tests are not less than 0.2 ppm or greater than 3.0 ppm in each instance. The determination of the amount of residual chlorine in the system shall be made at such points and in accordance with the required tests by means of a standard chlorine test kit for monitoring free chlorine.

F. After the water system or any other units or portions of the Project have been sterilized and thoroughly flushed, samples of water shall be taken from several points as directed by the Health Department. If repeated tests of such samples show the presence of coliform organisms, their sterilization shall be repeated and continued until tests indicate absence of pollution. On two consecutive days, 24 hours apart, bacteriological samples shall be satisfactorily completed and written notice is given before the system is placed into operation. At no point is water to be used from this system (except for flushing and chlorination) prior to satisfactory bacteriological results and approval for public use notification from the Health Department.

02660-3.6 Warranty.

A. All portions of the installed water system and site restoration shall be fully guaranteed against material defects or improper workmanship for a period of one year from acceptance by the Department.

02660-3.7 Testing.

A. Hydrostatic and Leakage Test:

1. After completion of all work and before Final Acceptance, hydrostatic and leakage test shall be conducted. Furnish and install the taps into the pipeline, the pipe connections, the measuring device and the water for testing. The duration of this test shall be not less than two hours at a minimum test pressure of 150 psi.

2. The maximum allowable leakage shall be determined by the formula:

$$L = \frac{SD(P)^{\frac{1}{2}}}{133{,}200}$$

Where:

L = Allowable leakage, in gallons per hour
S = Length of pipe being tested, in feet
D = Pipe diameter, in inches
P = Average test pressure during the test, in pounds per square inch, gauge

All defects discovered during this test shall be remedied and the test repeated before Final Acceptance.

02660-4 Method of Measurement.

02660-4.1 New Fittings:

The number of fittings to be paid for shall be the number of fittings in place, completed, and approved. It shall be measured per each and shall include bends, line stops, wet taps, jumper connections with RPZ backflow preventers, reducers, plugs, and ball valves and boxes. Fittings (other than those previously listed) shall be incidental to the pay item under the respective contract unit price for which they are a part; and, price shall include all materials, preparation, excavation, installation, labor, equipment, tools, supplies and incidentals to complete this work.

02660-4.2 New Pipe:

The quantity of potable pipe, installed by pipe culvert optional material - excavation or trenching, to be paid for will be plan quantity, in linear feet, in place and accepted. The plan quantity will be determined from the inside wall of the structure or fitting as shown in the Plans, along the centerline of the pipe.

Adjustment to bid quantities, prices and payment will not be allowed for increases, decreases or changes in material or installation requirements due to the use of any optional pipe materials.

If adjustments are required due to Plan errors or omissions or authorized field changes, the plotted material and not the material elected would be used to establish new pay quantities.

02660-5 Basis of Payment.

02660-5.1 New Fittings:

Payment shall be made at the contract unit price per each fitting. This price shall be full compensation to the Contractor for furnishing all materials, preparation, excavation, installation, labor, equipment, tools, supplies and incidentals to complete this work.

02660-5.2 New Pipe:

Payment shall be made at the contract unit price per linear foot. This price shall be full compensation to the Contractor for furnishing all materials, preparation, excavation, installation, labor, equipment, tools, supplies and incidentals to complete this work.

02660-5.3 Payment Items

Payment will be made under:

Item No. 02660-1 Potable Water Improvements --per Lump Sum (LS)

END OF SECTION 02660

SECTION 02730

SANITARY SEWER SYSTEM

02730-1 General

02730-1.1 Work Included

A. Furnish all labor, materials and equipment necessary to install sanitary sewer piping, manholes and appurtenances required for sanitary sewer system completion.

02730-1.2 Manufacturer's Qualifications

A. Firms regularly engaged in manufacture of sanitary sewer systems materials and products, of types and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

02730-1.3 Installer's Qualifications

A. The Concessionaire shall have at least three (3) years of successful installation experience on projects with sanitary sewer piping work similar to that require for this Project. Concessionaire shall have valid certified underground utility license.

02730-1.4 Requirements Of Regulatory Agencies

A. All work is subject to FDOT Standards, Florida DEP Regulations, and Southern Building Code Congress, Inc. (SBCCI) Standard Building Code.

02730-1.5 Reference Standards

A. American National Standards Institute (ANSI).

B. American Society for Testing and Materials (ASTM):

1. A 48 Specification for Gray Iron Castings.
2. C 150 Specification for Portland Cement.
3. C 478 Specification for Precast Reinforced Concrete Manhole Sections.
4. C 923 Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.
5. D 1248 Specification for Polyethylene Plastics Molding and Extrusion Materials.
6. D 2321 Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
7. D 3034 Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
8. D 3212 Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
9. F 477 Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

C. American Water Works Association (AWWA):

1. C110 Standard for Ductile-Iron and Gray-Iron Fittings, 3 Inch Through 48 Inch, for
   Water and Other Liquids.

2. C111 Standard for Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe
   and Fittings.

3. C150 Thickness Design of Ductile-Iron Pipe.

4. C151 Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids.

02730-1.6 Marking

A. Each length of pipe shall bear the name or trademark of the manufacturer, the location of the plant, and the date of manufacture. Each length shall likewise be marked to designate the class or strength of the pipe. The marking shall be made on the exterior of the pipe barrel near the bell end and shall be plainly visible. Pipe with special outlets or connections shall be marked to designate the specific installation location.

02730-1.7 Submittals

A. Manufacturer's Certificate of Compliance certifying compliance with the applicable specifications and standards.

B. Product data and installation instructions.

C. Shop drawings showing piping materials, size, locations, and elevations. Include details of underground structures, connections, and anchors. Show interface and spatial relationship between piping and proximate structures.

D. Maintenance data and parts lists for sanitary sewer system materials and products.

E. Include this data, product data, shop drawings, and record drawings in maintenance manual.

F. Pipe laying schedule indicating conformance to Project Schedule.

G. Testing procedure(s) for all pipe.

02730-1.8 Delivery, Storage And Handling

A. The Concessionaire shall be responsible for the delivery, storage, and handling of products.

B. Load and unload all pipe, fittings, and appurtenances by hoists or skidding. DO NOT

C. skid or roll products on or against other products. Use slings, hooks, and pipe tongs in such a manner that will prevent damage to products. Use of pipe tongs shall be prohibited if pipe linings are damaged by their use.

   Keep stored products safe from damage or deterioration. Keep the interior of pipe, fittings, and appurtenances free from dirt or foreign matter. Store gaskets and other products which may be deteriorated by sunlight in a cool location out of direct sunlight. Keep gaskets out of contact with petroleum products.

D. Promptly remove damaged products from the job site and replace with undamaged products.

02730-2 Products

02730-2.1 General

A. All pipe, fittings, and appurtenances shall be as indicated on the drawings and specified in this Section, and shall be new and unused.

B. All pipes shall be green in color.

02730-2.2 Gravity Sewer Pipe And Fittings

A. Polyvinyl Chloride Pipe (PVC):

1. PVC pipe and fittings, 100mm through 500mm (4 inch through 15 inch) diameter, shall conform to ASTM D 3034 with a standard dimension ratio (SDR) of 35. Joints shall be push-on joints conforming to ASTM D 3212. Solvent cement joints are NOT permitted.

2. All gaskets shall be molded into a circular form or extruded to the proper section and then spliced into circular form and shall consist of a properly cured high- grade elastomeric compound. The basic polymer shall be natural rubber, synthetic elastomer, or a blend of both, conforming to ASTM F 477. The gasket shall provide as adequate compressive force so as to affect a positive seal under all combinations of joint tolerances. The gasket shall be the only element depended upon to make the joint watertight. Gaskets shall comply with the Low- Head Application requirements of ASTM F 477.

3. Adaptors (if required) for joining ductile iron pipe to PVC and vitrified clay pipe to PVC shall be submitted to the Department for review and approval before being installed on the Project.

4. PVC sewer pipe shall be field cut using hand or power saws in accordance with the manufacturer's recommendations. The raw spigot end thus formed shall be filed to remove gasket damaging burrs and to form a standard bevel.

B. Ductile-Iron Pipe

1. Ductile-iron pipe shall be manufactured in accordance with AWWA C151. Pipe shall be designed for thickness in accordance with AWWA C150 subject to the following design criteria:

   a. ANSI Standard A21.10, 1034kPa (150 psi) minimum pressure rating.

   b. Laying condition B.

   c. Trench width small D+610mm (2 feet).

   d. The depth of cover shall be a minimum of 915mm (3 feet).

2. Fittings shall conform to AWWA C110, for push-on joints, and shall be standard-pattern cast-iron construction.

3. Gaskets shall be rubber and conform to AWWA C111.

4. All ductile iron pipe and fittings, unless otherwise shown or specified, shall be provided with a special interior lining. For sizes 150mm (6 inches) in diameter and above, the lining material shall be virgin polyethylene complying with ASTM D1248 (40 mils thick) heat bonded to the interior of the pipe for all pipe sizes. For 150 mm (6 inch) diameter, the lining material shall either be the aforementioned polyethylene system or a 40 mil thick coal tar epoxy system such as Protecto 101, KopCoat bitumastic 300-M, or equal. All pipe joint bells shall be coated on the inside with the same lining materials used in the pipe barrel. All field cuts shall be field coated with 40 mils of high build epoxy compatible with the lining.

5. Ductile iron pipe shall be as manufactured with a standard asphaltic shop coating for external protection. No special external protection is required.

02730-2.3 Steel Casing And Spacers
See Water Main Specifications

02730-2.4 Precast Concrete Manhole Fabrication

A. Manholes shall be constructed of precast reinforced concrete sections. Each manhole shall have a base section or tee section, barrel section, and an eccentric or concentric cone top, all as required. Manholes shall be built without steps. Except as otherwise specified or shown, precast concrete manholes shall comply with ASTM C 478. Only sulfate resistant cement (ASTM C 150, Type II) shall be used in the concrete mix.

B. Manholes barrel sections shall be constructed with preformed openings properly located for making sewer line connections. The diameter of such openings shall not be more than 100mm (4 inches) larger than the outside diameter of the pipe or pipe bell to be connected. The distance between the nearest edge of such openings and the shoulder of the barrel joint shall be 150mm (6 inches) minimum.

02730-2.5 Manholes In Sewers 1220mm (48 Inches) Or Less

A. Base sections for Standard Deep Type and Shallow Type Manholes shall consist of a Circular slab base with a minimum thickness of 200mm (8 inches) and shall be reinforced as shown on the Plans. The base slab can extend beyond the outside diameter of the barrel section, providing the extension is equal at all points on the circumference of the slab.

B. Barrel sections for Standard Deep Type shall have an inside diameter of 1220mm (48 inches) and a minimum wall thickness of 125mm (5 inches). A single line of circumferential reinforcement shall be placed inside the face of the wall. The bottom section of the manhole barrel shall be either integrally precast with the base section or cast separately with an approved 150mm (6 inch) PVC waterstop installed in the joint between the base slab and barrel section.

C. Top sections for Standard Deep Type Manholes shall be eccentric cones 900mm (3 feet) in height as shown on the Plans. The cones shall have walls a minimum of 125mm (5 inches) thick.

D. Barrel sections for Standard Shallow Type Manholes on 200 mm (8 inch) diameter sewers shall have an inside diameter of 1220mm (48 inches) and a minimum wall thickness of 125mm (5 inches). The bottom section of manhole barrel shall be either integrally precast with the base section or cast separately with an approved 150mm (6 inch) PVC waterstop installed in the joint between the base slab and barrel section.

E. Top sections for Standard Shallow Type Manholes shall be 600mm (2 foot) high concentric precast concrete cones with 600mm (2 foot) openings and walls a minimum of 125mm (5 inches) thick.

F. Ends of each length of manhole riser pipe and bottom end of manhole tops of the cone type shall be formed as detailed on the Drawings. All joints shall be watertight under all conditions of service.

02730-2.6 Curing

A. All precast concrete manhole sections shall be cured in accordance with any one of the methods specified in ASTM C 478. The Facilities for curing shall, however, be subject to review and prior approval.

B. No precast concrete manhole sections shall be delivered to the job site until the specified minimum compressive strength of 27.6 Mpa(4000 psi), as determined by crushing tests on cured concrete cylinders, has been obtained.

02730-2.7 Coatings

A. Interior and exterior of concrete manhole shall be coated with a protective epoxy coal-tar coating, minimum 16.0 mil dry film thickness.

B. Coatings shall be applied in strict accordance with manufacturer's published instructions. Coatings shall be KopCoat 300M or approved equal.

02730-2.8 Manhole Frames And Covers

A. Manhole frames and covers shall be of grey iron and shall meet the requirements of ASTM A 48, Class 30 B. Castings shall be smooth, clean, and free from blisters, blowholes, and shrinkage. Standard frames and covers shall be of the traffic type. The cover shall seat firmly into the frame without rocking.

B. Grind or otherwise finish each cover so that it will fit in its frame without rocking. Frame and cover shall be made watertight by means of dovetail groove and gasket in the cover. Frames and covers shall be matchmarked in sets before shipping to the site.

C. Before leaving the foundry, clean castings and subject them to a hammer inspection. Then dip castings twice in a preparation of asphalt or coal tar and oil applied at a temperature of not less than 88°Celsius (190 degrees F), nor more than 154° Celsius (310 degrees F), and in such manner as to form a firm tenacious coating.

02730-3 Execution

02730-3.1 Excavating, Trenching, Backfilling And Compaction

A. Perform in accordance with requirements of FDOT Section 120 - EXCAVATION AND EMBANKMENT.

02730-3.2 PVC Pipe Installation

A. Installation of PVC sewer pipe shall be in accordance with the recommended practices contained in ASTM D 2321 and UNI-B-5.

B. Unsupported trench width shall be limited to the minimum practicable width allowing working space to place and compact the haunching material. The maximum width shall be the pipe diameter plus 300mm (1foot) on each side of the pipe at springline for pipe in unsupported trenches. In sheeted trenches the width of trench between faces of the sheeting shall be adequate to allow the pipe bedding and haunching to be placed and

completed and the sheeting removed without disturbing the bedding and haunching material within two (2) pipe diameters on each side of the pipe. Trench boxes and moveable sheeting shall be wide enough to allow moving without disturbing the bedding and haunching within two (2) pipe diameters on each side of the pipe. Trench boxes and moveable sheeting shall be constructed and used in the trench to avoid disturbing the piping, bedding, and haunching when being moved forward in the trench.

C. Dewatering of the trench bottom shall be accomplished using adequate means to allow preparation of bedding, placement of haunching and pipe in a trench environment without standing water. Dewatering shall continue until sufficient backfill is placed above the pipe to prevent flotation.

D. Preparation of trench bottom shall provide firm, stable and uniform support for the full length of the pipe. Haunching of native material shall be placed to the spring line and compacted to a minimum 95% of the AASHTO T-180 proctor density. If ground water or trench bottom conditions are such as to require use of Class I material, either to aid in dewatering or to provide foundation and bedding for the pipe, the haunching shall also be of Class I material. Class I material contains angular, 6.35mm to 38.1mm (1/4 to 1-1/2 inch) graded stone, coral, crushed stone and crushed shells. Care shall be taken to place the haunching material, without voids, completely filling the trench from pipe wall to trench wall.

02730-3.3 Sanitary Sewer Line And Other Utilities

A. A minimum horizontal separation of 3.05 meters (10 feet) (outside to outside) shall be maintained between sewage collection mains and potable water mains. When the minimum Separation as specified cannot be maintained, the potable water pipe will be upgraded top ductile iron.

B. A minimum vertical separation of 450mm (18 inches) between the invert of the upper pipe and the crown of the lower pipe shall be maintained between sewage collection mains, and all other piping. At all crossings with less than 450mm (18 inches) vertical separation, the water main shall be ductile iron pipe a minimum 3.05 meters (10 feet) each side of he crossing. Sewage collection mains shall be laid below potable water and reclaimed water mains whenever crossing occurs.

02730-3.4 Manhole Installation

A. Set each precast manhole unit plumb on a bed of sealant to make a watertight joint at least 12.7mm (1/2 inch) thick with the concrete base or with the preceding unit. Point the inside joint and wipe off the excess sealant. Secure the manhole frame to the grade ring with grout and cement mortar fillet. Backfill, compact, and replace pavement or other surface as applicable.

B. Assemble units so that the top of the cover shall be flush with the adjoining pavement surface and/or ground surface. Install precast grade rings to provide for adjustment of the final elevation of the cover. Provide grade rings totaling not less than 150mm nor more than 300mm (12 inches) in height between the manhole frame and the top of the concentric cone or flat slab top.

C. Manhole bases shall be cast-in-place concrete, reinforced as indicated on Drawings, or monolithic base and first section combination. Manhole bases shall be cast or placed on a minimum of 225mm (9 inches) of compacted crushed stone. Precast concrete bases will be considered for use on a case by case basis.

D. Manhole channels or inverts shall be preformed and poured with 13.8 MPa (2000 psi) concrete to the spring line of the connecting pipe. The finished invert shall be semicircular shaped smooth channel directing the flow to the downstream pipe.

E. Connecting pipe shall be connected into manholes by means of a resilient connector between reinforced concrete manhole structures and pipe in accordance with ASTM C923. A waterstop gasket embedded in the manhole barrel similar or equal to Press Wedge II shall be acceptable.

F. All manhole frames shall be securely anchored to the cone section or flat slab top, as applicable, with frames bedded in mortar. The joint between the casting frame and the grade rings, and between the grade rings and the cone section or flat slab top, shall be fully mortared or gasketed and coated with a coal tar epoxy type coating upon reaching its final set. The joints shall be watertight.

G. Seal all joints between precast sections with both inner and outer rings of plastic sealing compound. Seal exterior of joints with Type II Portland cement mortar.

02730-3.5 Sanitary Sewer System Testing:
Prior to Final Acceptance of the Work:

A. All sewers shall be tested for alignment, deflection and integrity.

B. After completion of backfilling, all sewers shall be tested and inspected for infiltration or leakage by the Concessionaire with Department observation. All wyes, house connections and stubs shall be suitably plugged or bulkheaded to the satisfaction of the Department prior to testing. All sewers shall be cleaned and pumped out as necessary prior to testing.

C. All new sanitary sewer lines shall be inspected by closed circuit TV and accepted by the Department, whether private or County maintained. All tape will become Department property.

02730-3.6 Light Test
A. After backfilling to at least 300mm (1 foot) depth over any section of sewer which should have a uniform grade and straight alignment, the Concessionaire shall flash a light from manhole to manhole, or from manhole to clean-out location. The view through the line shall show a vertical axis in full pipe diameter and a horizontal axis in at least 3/4 pipe diameter. The Concessionaire shall be responsible for the removal and relaying of pipe as necessary to meet these requirements.

02730-3.7 Leakage Tests
All pipe sewers and appurtenant structures connected thereto shall be made as nearly watertight as practicable. Leakage tests shall be performed by the Concessionaire who shall be responsible for furnishing all necessary labor and equipment to conduct such testing.

A. Type of Test:

1. Gravity sewers shall be required to pass a leakage test before Final Acceptance. Leakage tests shall be by the low-pressure air test as described below.

B. Selection of Test Sections:

1. Each test section shall not exceed 122 meters (400 feet) in length and shall be tested between adjacent manholes.

C. Preparation and Coordination for Testing:

1. The Concessionaire shall flush all sewers with water sufficient in volume to obtain free flow through each line. Flushing water and debris shall not enter any pump station wet well. Water shall be pumped from the sewer system during flushing to an acceptable discharge location. A visual inspection shall be made and all obstructions removed.

2. The Concessionaire shall notify the Department forty-eight (48) hours prior to performing any leakage testing.

3. The results of all leakage tests shall be presented in neat, legible writing by the Concessionaire for distribution to applicable servicing utility agency authorities and the Department. These written results shall be formatted and adequately labeled so that they are easily understandable.

4. The Concessionaire shall install sufficient monitoring wells in the representative areas of the gravity system, acceptable to the Department, to determine the groundwater elevations. Monitoring wells shall be installed a minimum twenty-four (24) hours prior to testing.

D. Leakage Test

1. Leakage testing shall be conducted in accordance with the procedure for "Recommended Practice For Low Pressure Air Testing of Installed Sewer Pipe" as established by the Uni-Bell PVC Pipe Association. Passing this test shall be presumed to establish leakage test limits of 50-gallons per day per inch diameter per mile of sewer.

02730-3.8 Precast Concrete Manhole Testing

A. All precast concrete manholes are to be inspected by a certified laboratory, approved by the Department, to establish the strength of the concrete, the adequacy of curing, the certification of the date that the manholes were cast and the confirmation that the steel is properly placed, all according to the standard details and specifications.

B. Three (3) cylinders shall be taken each day that manholes are cast, with batch samples to be designated by the laboratory representative. At least one (1) set of cylinders shall be taken for each 6.9 cubic meters (9 cubic yards) of concrete used in the construction of the manhole sections. These samples shall be tested for strength. If the samples fail to meet minimum concrete strength requirements set forth in the specifications, then all manhole sections will be considered rejected.

C. In addition, the Department reserves the right to core manholes either at the site or point of delivery to validate strength of concrete and placement of steel. If cores fail to demonstrate the required strength, then all sections not previously tested will be considered rejected until sufficient additional cores are tested to substantiate strength requirements, all at the Concessionaire's expense.

02730-4 Method of Measurement

02730-4.1 Lift Station Relocation

No separate measurement shall be made for **Lift Station Relocation**. Payment shall be made at the lump sum contract price for **Lift Station Relocation.**

02730-4.2 New Structures:

The quantities to be paid for will be the number of manholes and cleanouts completed and accepted; and the number of structures of these types (including also valve boxes) satisfactorily adjusted.

02730-4.3 New Pipe Installed by Excavation or Trenching:

The quantity of gravity flow sanitary pipe and force main sanitary pipe, installed by pipe culvert optional material - excavation or trenching, to be paid for will be plan quantity, in place and accepted. The plan quantity will be determined from the inside wall of the structure as shown in the Plans, along the centerline of the pipe.

Adjustment to bid quantities, prices and payment will not be allowed for increases, decreases or changes in material or installation requirements due to the use of any optional pipe materials.

If adjustments are required due to Plan errors or omissions or authorized field changes, the plotted material and not the material elected would be used to establish new pay quantities.

02730-5 Basis of Payment

02730-5.1 Lift Station Relocation

Price and payment will be full compensation for all work and costs specified under this Section.

02730-5.2 New Structures:

Price and payment will be full compensation for furnishing all materials and completing all work described herein or shown in the Plans, including all clearing and grubbing outside the limits of clearing and grubbing as shown in the Plans, all excavation except the volume included in the measurement designated to be paid for under the items for the grading work on the project, all backfilling around the structures, the disposal of surplus material, and the furnishing and placing of all gratings, frames, covers, and any other necessary fittings.

02730-5.3 New Pipe:

Prices and payments will be full compensation for all work specified in this Section, including all excavation except the volume included in the items for the grading work on the project, all backfilling material and compaction; disposal of surplus material; and all clearing and grubbing outside of the required limits of clearing and grubbing as shown in the Plans.

02730-5.4 Payment Items:

Payment will be made under:

Item No. 02730-1 Sanitary Sewer Improvements --per Lump Sum (LS)

END OF SECTION 02730

SECTION 02800 - LANDSCAPE IRRIGATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 PROJECT DESCRIPTION

A. The contractor shall provide a complete irrigation system to support all landscaping within 20 ft of the terminal building.

B. The irrigation installation contractor, hereafter referred to as the “installer” or “contractor” shall provide all materials, labor, tools, equipment, construction permits, inspections and other items required for the execution and completion of the irrigation work for areas of the project as herein specified and indicated on the Drawings.

C. The completed system shall be fully operational from an electric irrigation controller and control valves. The system shall apply a uniform amount of water to the coverage areas. All equipment shall be installed and operated per the manufacturer's specifications.

D. The water supply for the irrigation system shall be an irrigation water meter. Prior to starting the irrigation installation, the installer shall verify the location of the meter, backflow preventer, and irrigation controller in the field with the Owner’s representative and furnish and install all prerequisite equipment.

E. The installer shall observe that the minimum water volume and static water pressure, as indicated on the irrigation plans, is available from the irrigation water meter. Prior to starting the irrigation installation notify the landscape architect or project manager and Contractor in writing if the observed water supply volume or static water pressure are less than the minimum amounts.

F. All work shall comply with local codes for connection to water supplies, electrical circuits, and the installation of irrigation systems.

1.3 GUARANTEE AND MAINTENANCE

A. All materials shall be new, and fully guaranteed for one year to be without defect, and of commercial quality or better. The installed system is guaranteed by the Installer for one year from date of written acceptance to give uniform distribution and even coverage.

B. Maintenance of the system includes raising and lowering of heads, cleaning and adjustment of heads, raising and lowering of trenches, and assurance that the system will give full and adequate coverage. Maintenance of the system shall be provided by the Installer at no charge until one full year after final acceptance.

1.4 SUBMITTALS

A. The system design is based on the operating characteristics of the irrigation equipment provided by the contractor.

B. Provide a digital image of materials cut sheets for all irrigation equipment to be used in the installation.

C. Provide a record drawing of the location of all underground piping, valves, and sprinkler heads, along with a complete parts list and equipment warranties as part of the closeout documents.

1.5 SPECIAL REQUIREMENTS

A. Comply with all local and state codes, ordinances, safety orders, and regulations of all legally constituted authorities having jurisdiction over this work, including but not limited to electrical and plumbing installations. The installer shall acquire an irrigation system construction permit if required by the local building and permitting agency.

B. The Installer shall make enough provisions that the owner's property will not be damaged by any construction operation. Any damage as a result of the installer’s work shall be brought back to the original condition by the installer, including but not limited to soils, slopes, drainage, paving, structures, grasses, plants, trees or utilities. The installer shall assure any existing irrigation systems remain operational during this phase of the development.

C. The Installer shall schedule all work so that there is no conflict with the visitors, staff of the owner or utility services at the property. Utilities are not indicated on the irrigation plans. The Installer shall verify the location of all utilities in the field according to state law.

D. The Installer shall keep “red line” as built drawings of the irrigation installation as the works progress. As built record drawings are to be provided upon request at 50% and 100% project milestones. The as built record drawings shall be prepared in accordance with section 3.07-B of these specifications. The as-built record drawing shall indicate at least two exact measurements from the irrigation equipment location to a fixed object on the site or another irrigation system component.

PART 2 – PRODUCTS

2.1 POLYVINYL CHLORIDE PIPE AND FITTINGS

A. Marking and Identification

PVC pipe shall be white in color and continuously permanently marked with the following information: name, pipe size, type of pipe and material SDR number, ASTM standard number, and the NSF (National Sanitation Foundation) seal.

B. All PVC mainline and lateral piping shall be Class 200. All irrigation sleeving shall be Class 200 PVC pipe.

C. All PVC solvent weld and threaded nipples shall be Schedule 80.

D. Use solvent weld pipe and fittings for 2.5” pipe sizes and less. Use solvent weld by threaded outlet service tees with schedule eighty thread by thread nipples at each control valve service tee location for all pipe sizes.

2.2 WIRE AND CABLE

A. All remote-control valve wires shall be type UF, 14 Gauge, solid strand copper wire, which is Underwriters’ Laboratory approved for direct underground burial when used in National Electrical Code Class II Circuit (30v AC or less). Provide white wire for common wire, red wire for hot wire.

B. All control wire splices shall be made in a plastic rectangular valve box with an epoxy or resin filled splice kit with cap. 3M DBY/R6, or equal. Provide sufficient wire leads to pull all splices to a minimum of one foot out of valve box for service. Make an expansion coil by wrapping all wire leads around a 1” pipe, ten times.

2.3 SPRINKLER HEADS, SWING JOINTS AND NOZZLES

A. Sprinkler head bodies and nozzles shall be as indicated on the legend notes and details on the irrigation plan drawings.

B. All pop up sprays, rotors and MP Rotators shall be connected to the lateral lines by 18” minimum lengths of flexible PVC tubing. The flex pipe may be solvent welded into the lateral line and connected to the sprinkler head with a solvent weld by thread street ell.

C. All pop-up sprinklers in turf or shrub areas shall be installed with the cap 1” above finished grade prior to sod or mulch surfacing.

2.4 IRRIGATION CONTROLLERS

A. Electric irrigation controller shall be a commercial grade multi-zone device, Rain Bird ESP-TM2 smart irrigation Wi-Fi timer/controller or approved equal as indicated on the legend notes and details on the irrigation plan drawings prepared by the irrigation contractor. The timer shall be connected to irrigation zones for the building and parking lot sites and shall include a rain sensor device for measuring soil moisture levels.

B. 120-volt, 6-amp, single phase irrigation controller shall be provided by the building contractor at the irrigation controller location. The irrigation installer shall provide permits and a licensed electrician to connect the controller equipment to the power supply.

C. Provide a ground rod, CAD Weld Kit, and 12 Gauge ground wire for grounding the irrigation controller. The controller grounding shall achieve a 5 Ohms or less Megger Device reading or less.

2.5 VALVES AND VALVES BOXES

A. All electric irrigation control valves shall be as indicated on the legend notes and details on the irrigation plan drawings. Control valves shall be fully automated by a 24v. electric current sent from the irrigation controller. All valves shall be plastic, globe configuration, commercial grade, and have a flow control adjustment stem.

B. Plastic 15” rectangular valve boxes and jumbo valve boxes shall be installed 1” above the finished grade before mulch or sod installation for each valve location shown on the drawings. Do not install any two valves in the same box. Manufacturer’s specification and installation instructions for control valves shall become a part of these specifications.

C. All control valves shall be installed with a minimum of 2” horizontal clearance of the valve box sides, and the valve stem shall have a 4” minimum and 6” maximum vertical clearance of the valve box lid for ease of valve services.

D. Isolation valves 2.5” and less shall be bronze thread on type gate valves with wheel operation handle. All isolation valves shall be mounted in plastic 15” rectangular valve boxes with sleeves as needed.

E. Backflow preventer and backflow cover shall be as indicated on the legend notes and details on the irrigation plan drawings.

F. Quick coupling valves shall be mounted on 1” o-ring type PVC triple swing joint. Provide minimum 12” mid-section nipple length. Provide valve stabilization with an 18” piece of 1” angle iron and stainless steel screw type hose clamps. All quick coupler valves shall be mounted in plastic 10” round valve boxes.

PART 3 – EXECUTION

3.1 EXCAVATION, BACKFILL, AND SAFETY PRECAUTIONS

A. All excavation in this contract shall be unclassified and is to include earth, loose rock, rock or any combination thereof, in wet or dry state. The Installer may use a vibratory plow to pull irrigation pipes into the ground for the system.

B. It shall not be necessary for the Installer to remove any turf or sod before trenching or pulling.

C. All trenches shall be backfilled with the materials removed and shall conform to adjacent grades without dips, sunken areas, humps, or other irregularities.

D. The Installer shall take precautions to avoid accidental injury to persons and pedestrians in the project area. At no time shall equipment or materials be stored on walkways. Materials, pipes and other items shall be stored in one designated, and approved, storage area away from pedestrian traffic.

E. All suitable backfill material shall be loaded into the trench in four-inch lifts. Each lift shall be tamped or flooded in order to prevent after settling. The Installer may leave a three-inch soil layer over trenches to accommodate for initial settling. After initial settling, and prior to establishment of the surface treatment, all excavated areas shall be hand raked to leave the soil grade in as good or better condition than before excavation.

F. Should settlement of the grade over irrigation trenches occur, the Installer shall be required to remove surface vegetation, refill soil to proper grade, and replace the surface treatment without extra cost to the owner. In turf areas where excavated settling is less

than one inch, the Installer may bring the settled area back to grade with a sand top-dress process. The Installer shall perform this work as necessary during the guarantee period.

G. Existing trees and shrubs shall not be damaged. Route all trenches outside of tree drip lines to minimize damage to existing tree roots. When necessary, the Installer shall excavate under or around any major tree roots. Major tree roots shall not be cut.

H. It is understood that the piping layout is diagrammatic, and piping shall be routed around existing underground pipes or utilities in such a manner as to avoid damage to these elements. The Installer shall have all existing pipes and utility lines located within the work area before any trenching. Any damage and subsequent repair of streets, walks, pipes, and utility lines shall be the responsibility of the Installer.

3.2 PIPE INSTALLATION

A. The piping between the source of water supply and the electric control valves which is under constant pressure is hereinafter referred to as the "main line" in this project. The piping on the discharge side of the control valve that connects the sprinkler heads to the valve is hereinafter referred to as the “lateral line”.

B. All electric control valves, drain valves, isolation valves and quick coupler valves shall be installed on the main line. Maintain at least 18” of fill over all main line pipes. Maintain at least 12” of fill over all lateral line pipes.

C. All lumber, rubbish, and large rocks shall be removed from the excavated trenches. Wedging or blocking pipe is not permitted. Do not glue and install PVC pipe when temperature is 32 degrees F. or below. Install solvent weld fittings and pipes level and plumb in all directions. Backfill trenches with 4” soil lifts and compact or water jet each lift to remove air pockets in soil backfill.

D. Provide one cubic foot minimum concrete thrust block at each directional fitting on the mainline. Thrust block shall be formed and poured against a wall of virgin soil.

3.3 PVC PIPE AND FITTING ASSEMBLY

A. Cleaning: All foreign matter or dirt shall be removed from inside and outside of pipe before gluing, and piping shall be kept clean by approved means during and after installation of pipe.

B. All glue joints shall be made using PVC primer and PVC medium bonded cement as recommended by the manufacturer.

C. Flush all pipelines with water within twenty-four hours of installation to remove excess glue that may collect at pipe joints and fittings.

D. All threaded fittings on the main line side of the control valves shall be made watertight with the use of Teflon tape preparation.

3.4 CONTROL VALVE WIRING

A. Wire from the electric irrigation controller to the control valves, and wire splices, shall be supplied in accordance with the Product Section 2.02. Use white color insulated wire for the common wire.

B. Where control wires are installed remotely of mainline piping, install control wires in 1.5” size grey electrical conduit with sweep els and pull boxes every 200’, and provide a continuous strip of metal detector tape 12” above the topside of the wire conduit. No conduit is required for the control wires when they are laid in trenches provided for main line piping as indicated on the drawings.

C. At the connections of the control wires to the control valves, create a wire expansion coil by turning each wire around a 1" pipe ten times.

D. The Installer shall make all provisions for mounting and wiring in the controller and the control wires as indicated or noted. The existing site irrigation zones shall be connected to the new irrigation timer and controller.

3.5 FINAL ADJUSTMENT

A. The system shall be completely flushed to remove any and all debris from the lines prior to mounting the sprinkler heads onto the flex joints.

B. After all sprinkler heads have been properly mounted, install all sprinkler nozzles and adjust for proper radius and arc of throw to minimize overthrow on paved areas and structures.

C. Adjust each control valve flow stem to the proper operating position for the valve zone flow demand. This position is found by turning the flow control stem down until the spray of the sprinklers is slightly reduced.

3.6 PRESSURE TESTING PROCESS

A. Once the mainline and irrigation valves have been installed; the Installer shall perform a preliminary pressure test. Once a preliminary pressure test is performed successfully the contractor shall request a final pressure test under the supervision of the Owner’s representative.

B. The Installer shall mount a water pressure gauge on a quick coupler key for verification of the pressure test process. The Installer shall isolate no more than 1000’ of the mainline for any one test. The Installer shall charge the mainline with static water pressure. The mainline shall remain isolated and pressurized for two hours under the Owner’s supervision.

C. If more than two (2) PSI water pressure drop occurs during the testing process, the Installer shall repair the leak and repeat the test process.

D. The Owner’s representative shall notify the Installer upon successful completion of the test process. Upon notification of completion of testing, the Installer may completely backfill and cover the mainline.

3.7 PRELIMINARY INSPECTION

A. Upon completion of all previous items, the installer shall inspect each valve and head on the system. Should any items be found which do not meet the requirements of the drawings or these specifications they will be flagged and repaired prior to the final inspection.

B. Prior to the final inspection of the irrigation system the Installer shall provide the completed “red line” as built record drawing, showing to scale accurate locations of mainlines, valves and electrical splices as installed in the construction phase. The as built record drawings shall indicate at least two exact measurements from the irrigation equipment location to a fixed object on the site or another irrigation system component.

3.8 FINAL INSPECTION

A. The Installer shall make all repairs listed on the punch list and complete all pressure tests and submit the “as-built” record drawing prior to requesting the final inspection. The Installer shall provide two assistants and two 2-way radios to help in the operation of the system at the final inspection.

B. If any items are not installed and operating to the construction documents, a punch list will be created. If all items are found to be complete and in proper working order the Owner will issue a letter of substantial completion.

C. If all items are not completed and are not in proper working order at the time of the final inspection, the Installer shall be responsible for the cost of any additional site visits by the Owner’s representative, including travel expenses.

3.9 GUARANTEE AND MAINTENANCE

A. After receipt of the letter of substantial completion, the Installer shall guarantee for one year all materials and workmanship within the system as these specifications call for.

B. During the guarantee and maintenance period, the Installer shall return to the site at the request of the owner to repair any elements or materials in the system that have failed, fallen out of adjustment, or have broken due to work performed during installation. The Installer shall provide all labor and materials to bring the system back to a full and correct operational condition.

C. The Installer shall also make any repairs to the turf or shrub areas where the finished grade has changed due to settling trenches.

D. At the end of the guarantee and maintenance period, the Owner shall inspect the system to make sure that the guarantee and maintenance provisions have been complied with.

3.10 OWNER’S RIGHT TO ACCESS FOR OBSERVATION OR OTHER WORK

A. Owner reserves the right of access to any part of the Work, at any time, for the purpose of observation, or to install other work, either with its own forces or with other contrac-

tors. Such access is not to be construed to mean partial occupancy by Owner and claim for additional compensation by the Contractor because of such access.

B. Cooperate with Owner during Owner's access for observation of work, and coordinate work with the Owner's requirements.

C. Work shall not be allowed unless the Owner is present on the site to observe the operations. Any work done without the proper observation will be subject to removal/replacement as required by the Owner at no additional cost to the Owner.

3.11 PAYMENT

A. Payment for all irrigation work shall be included in the Pay Item TB-1, Terminal Building, Complete.

END OF SECTION 02800

SECTION 02900 – LANDSCAPE SPECIFICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

A. The landscape design shall be completed by a licensed landscape Architect. The landscape contractor (LC) shall provide all design, plant selection, labor, materials, plant materials, soil additives, equipment, services, and facilities required to complete all landscape planting and related work, within 20 ft of the terminal building, as specified herein or both, to comply with the local landscape ordinances and codes. Plant selection shall be subject to approval of the Owner.

B. Protection of Public Property: The LC shall, at all times, protect all materials and work against injury from any cause, and shall provide and maintain all necessary guards for the protection of the public. The LC shall be held responsible for any damage or injuries to persons or property that may occur as a result of his/her fault or negligence during the execution of the work. The LC shall insure that his work does not interrupt established or projected drainage patterns.

C. Change Orders: Any change or substitution in the landscape work must be negotiated between the LC and the Owner or Owner's designated representative and approved in writing. Any work performed on changes or 'extras' prior to execution of a written agreement will be compensated for by the Owner at the Owner’s discretion.

1.3 QUALITY ASSURANCE

A. Coordination: The LC shall coordinate with the Owner or Owner’s designated representative in monitoring and approval of all items and areas of work required.

B. Reference Specifications and Standards:

1. Florida Nurserymen and Grower's Association's (FNGA) established standards.
2. Florida Turf Grass Association's (FTGA) established standards.
3. Florida State Department of Agriculture, Bureau of Plant Industry, "Grades and Standards for Nursery Plants", latest edition.
4. American Association of Nurserymen, "Horticultural Standards".
5. Nomenclature: Conform to names given in "Standardized Plant Names", prepared by the American Joint Committee on Horticultural Nomenclature.
6. Applicable federal, state, or other governing laws and standards, as specified hereafter, or as may otherwise apply.

C. Source Quality Control:

1. The LC shall ship all landscape materials to the job with appropriate Florida State Department of Agriculture, Bureau of Plant Industry, Certificates of Inspection.

2. The LC shall provide trees and shrubs grown in a licensed nursery in accordance with standard horticultural practices.
3. The LC shall provide certification of work performed by an agricultural soil testing laboratory, certified in the State of Florida for all soil testing services.

D. Inspection: The LA or the Owner or the Owner's designated representative reserves the right to inspect plant materials either at place of growth or at the site prior to planting to ascertain compliance with requirements for name, variety, size, and quality. Final approval shall be based upon the in-place inspection. Any plants that are not in compliance shall be removed and replaced at the LC's expense.

E. Substitutions:

1. No substitutions will be allowed once the landscape Plan is approved by the Owner or Owner's designated representative, unless the Owner or Owner's designated representative is first notified and written approval by the LA or Owner or Owner's designated representative is received.
2. If the specified or detailed landscape materials are not obtainable, provide the LA and Owner or Owner's designated representative with a written proposal for use of equivalent material.
3. Written information regarding all substitutions will be required at the time of substantial completion.

F. Testing:

1. At the LC's expense, an agricultural soil testing laboratory, certified in the State of Florida, shall be required to perform soil testing services, from selected areas that are to be planted, to investigate physical properties, diagnose problems and program amendments to promote optimum plant growth. Test sites shall be approved or designated by the LA or the Owner or Owner's designated representative . Test quantities can be readjusted by the LA or the Owner or Owner's designated representative according to the specifics of the site.
2. The LC shall provide laboratory testing and evaluations of stockpiles of on-site topsoil or of prepared backfill or planting mixes and present the certified soil laboratory recommendations of ratios and formulas for amending the site soil to the LA and the Owner or Owner's designated representative.
3. See plan for quantity and location of soil tests. Samples of each soil selection shall be submitted to the LA or the Owner or Owner's designated representative.
4. Soil Mixes:

    a. Prior to installation, LC shall provide a soil test (chemical/textural analysis) for each specified stockpiled soil mix to confirm that soils meet the required specifications. Samples of each soil selection shall be submitted to the LA or the Owner or Owner's designated representative.
    b. If there are multiple soil mix types for different landscape areas, the LC shall test each separate stockpile assigned to a respective planting area.
    c. All testing shall be done in a designated soil mixing area; not within planting beds.

5. The soil analysis report for each individual sample shall, at minimum cover the following:

a. Percentage of organic matter and mineral content: sand, silt, and clay content. Organic matter to be determined by loss on ignition by volume.
b. Salinity.
c. pH.
d. Soil bulk density.
e. Major Element Analysis, including concentrations of nitrogen, phosphorus, potassium, calcium, and magnesium, etc.
f. Minor Element Analysis, including concentrations of iron, copper, zinc, boron, manganese, etc.
g. Sand fraction Analysis: Percentage (%) passing a 1", 1/4'. And No. 200 sieves.
h. Percolation : 4-8 Inches/hour, by the United States Golf Association Method or similar.
i. Separate soil amendment and fertilizer recommendations for each combined topsoil/planting soil test to address deficiencies and maintain plantings in optimal condition. Provide copy of soil specifications along with samples to testing laboratory.
j. Furnish data on potential hazards or impediments to plant growth from salinity, sodium boron or impaired soil structure.
k. Eight (8) of the above soils test shall be performed. Locations shall be determined by the LA.
l. If no topsoil adjustments or replacements are expected, LC shall perform four (4) additional soil compaction, infiltration and bulk density test(s) in high-traffic or potentially compressed areas designated as lawn on the landscape planting plan and prior to commencement of planting. Results of the test shall be submitted to the LA or the Owner or Owner's designated representative, along with recommendations to correct or remedy any problems.

6. See 2.02.A. for required topsoil characteristics.

G. LC's Responsibilities:

1. The LC shall furnish all labor, materials, and equipment necessary for the completion of items shown on the plans and specifications.
2. Work shown on the plans and not mentioned in the specifications, or vice versa, shall be done as if shown on both and should any actual or apparent inconsistencies or errors be found, the LC shall notify the LA and the Owner or Owner's designated representative as soon as they are discovered and not proceed with any work where such uncertainty exists.
3. Should any objectionable materials, such as old concrete, asphalt, lime rock sub-base, bricks, or other debris be encountered during planting operations, they shall be removed from the site and properly disposed of by the LC.
4. The LC is entirely responsible for the work until Final Acceptance.
5. Project supervision: The LC shall have labor crews controlled and directed by an experienced supervisor well-versed in reading blueprints and specifications pertaining to landscape installation and maintenance. NOTE: A supervisor shall have current plans and specifications readily available, on-site, at all times.

1.4 SUBMITTALS

A. Review and Approval: All submittals shall be submitted by the LC to the Owner or Owner's designated representative a minimum of six (6) weeks prior to the installation of any of the materials, The LC shall not begin work until all submittals have been approved by the LA and the Owner or Owner's designated representative.

B. Installation Schedule: The LC shall submit to the LA and the Owner or Owner's designated representative for approval, a planting installation schedule showing dates for starting each type of planting in each area of the site.

C. Soil & Planting Mix Samples: Where site topsoil is not present or does not meet with qualifications described herein, the LC shall submit samples of organic and mineral soil amendments or topsoil mix to the LA and the Owner or Owner's designated representative; accompanied by analytical data and the recommended ratios / formulas of products for amending the site soil.

D. Warranties, Certificates, and Inspection Tags:

1. The LC shall submit warranties, certificates, and inspection tags to the LA and the Owner or Owner's designated representative for all products and materials as defined under Part 1.6, 'Warranties'.
2. The LC shall submit certificates of inspection for all materials and products subject to state or federal governmental inspection to the LA and the Owner or Owner's designated representative. The LC shall also submit certification of compliance of sod type and quality with specifications.

E. Test Reports and Recommendations:

1. The LC shall provide signed original copy(s) of the soil analysis, obtained from the certified soils testing laboratory, to the Owner or Owner's designated representative and LA.
2. The LC shall provide Soil Test Reports of existing soil conditions at selected locations within the project area at test sites approved by the LA or the Owner or Owner's designated representative. See section 3.2 for quantity of test sites. Quantities can be readjusted by the LA or the Owner or Owner's designated representative according to the specifics of the site.
3. The LC shall submit four (4) copies of all Soil Test Reports, with the dates and test site locations clearly marked, to the LA and the Owner or Owner's designated representative prior to any planting.

F. Maintenance Instructions: Prior to the end of the maintenance period, the LC shall furnish three (3) copies of written maintenance instructions to the Owner or Owner's designated representative for maintenance of the installed plants throughout their full-growing season.

G. Documentation of Plant Availability: Prior to commencing work and procuring plant material, the LC shall provide the Owner and LA with written documentation that all of the plant materials can be supplied as specified within the timeframe designated by the Owner. The LC shall verify that the nursery sources, quantities, size, and specimen quality for each plant specified can be provided. If specified plant material is not obtainable, the LC shall submit written notice of non-availability together with a proposal to the LA and the Owner or Owner's designated representative for an equivalent

substitution. Under no circumstances shall any substitutions be made without the prior written approval of the LA or the Owner or Owner's designated representative.

H. Schedule to Field Tag Plant Materials: If requested, prior to procuring plant material, the LC shall coordinate and make all arrangements with the LA and the Owner or Owner's designated representative to visit the nurseries for the purpose of selecting and tagging the specified plant materials. The LC shall schedule the field visits at times convenient to all parties with reasonable written notice and confirmation provided.

I. Plant Samples: If requested, the LC shall provide three (3) selections of each shrub and ground cover, etc., as specified, for approval by the LA and the Owner or Owner's designated representative. Approved selections shall be used as the representative size, specification, and plant type for all plant materials to be installed. Any plant materials that do not conform to the plans, specifications, or approved plant samples shall be rejected.

J. Plant Photographs: If requested, the LC shall provide two (2) sets of representative color photographs of all plant materials specified with a measuring rod included in the photograph. All photographs shall be legible with minimal dark shadows obscuring planting details. Each picture shall have the date electronically imprinted and the source, species, size, and quantity clearly labeled in waterproof ink on the back of each photograph. Photographs shall be provided as part of the documentation of plant availability and prior to scheduling field visits.

K. Fertilizer(s) Sources, Types, Formulas, and Application Rates.

L. Samples of Mulches: Specified herein.

M. "As-Built" Record Landscape Planting Drawings:

1. The LC shall prepare legible "As-Built" record drawing(s) on reproducible bases procured from the LA which shall show landscape trees, shrubs, ground cover, annuals, vines, aquatics, sod, etc. The record drawings shall also indicate and show approved substitutions of size, material, and any other deviations from the construction documents.
2. The LC shall store the record drawings apart from documents used for construction.
3. The LC shall maintain the record drawings in a clean, dry, legible condition and in good order. The LC shall not use record documents for construction purposes.
4. The LC shall make the record drawings and documentation of pending changes available at all times for inspection by the LA or the Owner or Owner's designated representative.
5. The LC shall label each record drawing and associated document "AS-BUILT RECORD DRAWING" in neat, large, printed letters, or by rubber stamp.
6. The LC shall record information concurrently with construction progress.
7. The LC shall legibly mark the record of actual construction and installation on the record drawings including, but not limited to:

    a. Field changes of dimensions and detail;
    b. Changes made by Field Order or by Change Order,
    c. Details not on the original contract drawings; and
    d. Landscape substitutions.

8. Specifications and Addenda: The LC shall legibly mark each section to record changes made by Clarification, Field Order, and/or Change Order.
9. The LC shall submit the "As-Built" record drawing(s) to the Owner or Owner's designated representative upon completion of the project.
10. "As-Built" record drawings shall be kept updated weekly and shall be reviewed by the LA and/or the Owner or Owner's designated representative during the course of the work. If, during the course of the work, the record drawings are found substantially incorrect or substantially behind the progress of the work, the Owner shall have the right to hold progress payments until said drawings are brought to an acceptable level of completeness.

1.5 PROJECT CONDITIONS

A. Existing Conditions:

1. The LC shall examine the project site, verify elevations, observe the conditions under which the work is to be done, and notify the Owner or Owner's designated representative and LA of any unsatisfactory conditions.
2. The LC shall not proceed with work in this section until conditions have been corrected to the Owner or Owner's designated representative's satisfaction.

3. Utilities:

    a. The LC shall determine the location of surface and underground utilities.
    b. The LC shall exercise care in digging and other work so as not to damage existing work including underground cables and pipes.
    c. Should such underground obstructions be encountered, which interfere with his work, the LC shall notify the LA or the Owner or Owner's designated representative immediately.

4. The LC shall be responsible for the immediate repair of any damage caused by his work and will be responsible for any disruption of service caused by this damage. Patching and replacing damaged work will be accomplished by the Owner's designated Contractor and the cost of this will be paid by the LC.
5. The LC shall maintain grade stakes set by others until removal is approved by all parties concerned.
6. Excavations: When conditions detrimental to plant growth are encountered, such as rubble, fill, road sub-base, adverse drainage conditions, or obstructions, the LC shall notify the LA and the Owner or Owner's designated representative immediately. Work in the affected area shall cease until conditions have been corrected to the Owner or Owner's designated representative satisfaction.

B. Protection:

1. The LC shall verify with the GC which areas of the site shall be free of construction-related compaction or degradation during the construction process and to specify a protected location for the stockpiling of existing site topsoils and imported soils, soil mixes and amendments.

    a. LC shall excavate planting beds as noted on the plans.

b. Soil from the “O” (leaf layer) and “A” (topsoil layer) horizon shall be stockpiled and protected for testing and amendment purposes, separately from other “base mineral soils”.
c. The LC shall arrange for the stockpiling and protection of any imported topsoil and soil amendments (e.g. mineral soils, organic compost, organic matter, etc.).
d. Soil stockpiles shall not exceed a height of three feet above their base.
e. If leaf litter horizon or topsoil horizon are not present or are contaminated, any remaining matter shall be removed from the site.
f. When indicated on plans, soil shall be removed to a depth of 9 inches within proposed “special soils” areas. If not contaminated, these soils may be stockpiled separately from other soils and considered for “base mineral” soils use in creating the special soils mix.

2. The LC shall protect and maintain, as part of the work of this section, all existing plant materials (if applicable).
3. The LC shall verify that all existing trees to remain (if applicable) are properly identified and barricaded to prevent damage by their work under this and future construction. The LC shall be responsible for maintaining adequate identification and barricading of all existing plant material to remain throughout the installation and required maintenance period.
4. The LC shall protect all materials and work against injury from any cause and will provide and maintain all necessary safeguards for protection of the public. The LC shall be held responsible for any damage or injury to person or property that may occur as a result of his/her negligence in the prosecution of the work.
5. The LC shall insure that his work does not interrupt established or projected drainage patterns.

C. Sequencing and Coordination:

1. Prior to all work, coordinate the work of this section with related work of other trades, and inform the LA and the Owner or Owner's designated representative of any scheduling or other discrepancies relating to work to be performed.
2. The LC shall notify the Owner or Owner's designated representative and LA of anticipated installation phases and date(s) at least two (2) weeks in advance.
3. Unless specified otherwise, the LC shall not commence planting until:

a. Site grading, soil import, and soil testing and preparation has been completed and approved.
b. Irrigation system has been approved or the Owner or Owner's designated representative is satisfied that substantial provision for watering is available to maintain plant materials.

4. The LC shall proceed with and complete the landscape planting work, as rapidly as portions of the site become available or as otherwise directed.
5. Coordination with lawns:

a. The LC shall plant trees and shrubs after final grades are established and prior to planting of lawns, unless approved otherwise.

b. When planting of trees and shrubs occurs after lawn installation, the LC shall protect lawn areas and promptly repair damage to lawns resulting from planting operations.

6. The LC shall produce 'AS BUILT' record drawing documentation as specified in Section 1.4(N).

1.6 WARRANTIES

A. Shrubs and Ground Cover: The LC shall warrant shrubs and ground cover in writing for a period of 180 days beyond the date of Final Acceptance.
B. Trees and Boxed Materials: The LC shall warrant trees and boxed materials in writing for a period of one (1) year beyond the date of Final Acceptance.
C. Sod: The LC shall warrant sod in writing for a period of six (6) months beyond the date of Final Acceptance.

1.7 METHOD OF MEASUREMENT

A. Quantities: The quantities given in the plant list are approximate only and the LC shall verify, furnish, and plant all plants required to complete the work, as shown on the drawings and in the specifications at no additional cost.

B. Measurement:

1. Trees, shrubs, and ground cover will be measured for payment based on each individual plant properly installed and accepted.
2. Associated products, equipment, and execution necessary or incidental, thereto, will not be separately measured, but will be considered as included in the measurement for trees, shrubs, and ground cover.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. Name and Variety:

1. As designated on the Owner or Owner's designated representative approved drawings and plant list, and the site plan showing landscaped areas.
2. The LC shall provide all plant materials conforming to latest edition of “Horticultural Standards of the American Association of Nurserymen.”
3. Names used are those of “Standardized Plant Names.”
4. The LC shall attach appropriate identification tags to each plant for all varieties specified as ‘patented’, registered’, or ‘trade-marked’. The LC shall not remove tags until inspected and approved by the LA or the Owner or Owner's designated representative.
5. The LC shall obtain from his supplier a notarized Certification of Variety that clearly states the Genus, Species and sub variety of the Palm material (excluding Sabal palmetto, Cabbage Palm) he is providing**.** This certificate should state the customer name and the suppliers invoice number associated to that particular delivery or sale.

B. Quality:

1. Unless otherwise specified, all plants shall meet or exceed the 'Florida No. 1' standards in accordance with "Grades and Standards for Nursery Plants", published by the State of Florida, Department of Agriculture. Plants judged not in accordance with the specified standards will be rejected.
2. Plants designated as specimen shall be 'Florida Fancy' plant material in accordance with "Grades and Standards for Nursery Plants," published by the State of Florida, Department of Agriculture. Plants judged not in accordance with the specified standards will be rejected.

3. The LC shall provide plant materials that exhibit the following:

    a. Symmetrical, with normal habit of growth, characteristic of the species or variety.
    b. Healthy with well-developed root systems filling their containers, but not to the point of being root-bound. B&B plants shall have vigorous, fibrous feeder roots, visible outside the ball wrap.
    c. Sound, free of mechanical or cultural injury, and free of noticeable effects of disease, insects, eggs, bores, and defects such as knots, sunscald, windburn, injuries, abrasion, or disfigurement.

C. Dimensions:

1. Measure height and spread of all plants with branches in their normal position. Height and spread dimensions specified refer to the main body of the plant and not extreme branch tip-to-tip. The measurements specified are the minimum acceptable size and are the measurements after pruning, where pruning is required.
2. When dimensions of plant materials are omitted from the plant list, the LC shall provide plants of normal stock for the type listed.
3. The caliper shall be measured six inches (6") from the ground on trees up to and including four inches (4") in caliper and twelve inches (12") above the ground for larger caliper trees.
4. Trees shall conform to the measurements specified or indicated on the drawings and shall not vary from the size specified more than ten percent (10%) or have a caliper size which varies more than one-fourth inch (1/4"). Where a single trunk is specified, the plant shall have a single, straight trunk for a height of not less than what is specified on the drawings.

D. Trees:

1. The LC shall provide healthy, vigorous stock grown under climatic conditions similar to conditions in the locality of the project and free of disease, insects, eggs, larvae, and defects such as knots, sun-scold, injuries, abrasions, or disfigurement.
2. The LC shall provide trees, of the sizes shown and specified. Trees of larger size may be used if sizes of rootballs are increased proportionately and if accepted by the LA or the Owner or Owner's designated representative. *Refer to 2.1(C) 6 – Tree Caliper to Rootball/Container Size.*
3. Trees, unless otherwise noted, shall be nursery/tree form grown. Collected trees will not be accepted.
4. All trees specified as container-grown shall have been grown in a rigid container (grow bags are unacceptable) for a minimum of two (2) years prior to installation.
5. Balled and burlapped (B&B) trees:

a. B&B trees shall have been root-pruned during the growing season prior to the installation date. The harden-off period shall commence no later than six (6) weeks prior to installation date.
b. The minimum rootball for B&B plant material is expressed by the caliper-to-rootball diameter ratio. The number is determined by dividing the rootball diameter (inches) by caliper (inches). *Refer to 2.1(C) 6 – Tree Caliper to Rootball/Container Size*
c. The rootball diameter is defined as the average widest portion of the rootball and the measure perpendicular to it. The measure shall be taken within the upper one-third (1/3) of the rootball.
d. Properly cured trees shall have visible feeder roots growing through the burlap. Trees delivered to the job site without visible feeder roots shall be subject to rejection by the LA or the Owner or Owner's designated representative.
e Only organic burlap and jute twine shall be used for rootball containment; Synthetic materials (e.g. Lenomesh) are not acceptable substitutes and are subject to rejection by the LA or the Owner or Owner's designated representative. After installation, the burlap and twine shall be completely removed from the upper one-third (a) of the rootball and disposed of off-site by the LC.
f. Wire baskets shall only be used during delivery to the job site, and installation and may remain in the plant pit provided the upper one-third (1/3) is removed and disposed of off-site by the LC.

6. Tree Caliper to Rootball/Container Size.

TREE CALIPER TO ROOTBALL/CONTAINER SIZE			
Caliper	**Minimum Diameter Rootball**	**CRB**	**Minimum Container Size**
1.25”	18”	14.4	7 Gal
1.50” 2.00”	20” 24”	13.3 12.0	15 Gal
2.50”	28”	11.2	25/30 Gal
3.00”	32”	10.7	45 Gal
3.50”	36”	10.3	65 Gal
4.00” 4.50” 5.00”	40” 44” 48”	10.0 09.8 09.6	95/100 Gal
5.50”	50”	09.1	200 Gal
			Table 1.0

E. Shrubs and Ground Cover:

1. The LC shall provide shrubs of the sizes shown or specified. Shrubs of larger size may be used if the sizes of the roots are increased proportionately, and if accepted by the LA and the Owner or Owner's designated representative.
2. Plants shall have been grown in containers for a minimum of six (6) months and a maximum of two (2) years and shall have sufficient roots to hold soil together after removal from containers. Shrubs shall not be root-bound or have hardened-off root systems.

3. Plants will not be accepted if the body has become too large for the size of the container or if the plant has become root bound.
4. Plants shall not be removed from the container until immediately before planting.

F. Ball and Burlapped (B&B) Plants, and Wired-Balled and Burlapped Plants (WB&B): (Only When Applicable.)

1. No plant shall be accepted when the ball of soil surrounding its roots has been cracked, broken or shows evidence of being 'made'.
2. The diameter of the rootball must be sufficient to encompass the fibrous and feeding root systems, necessary for the maximum development of the plant, and shall conform to sizes and ratios in the table of minimum ball sizes as set forth in "Grades and Standards for Nursery Plants".
3. Roots shall have been root-pruned during the growing season prior to the installation date. The hardened-off period shall commence a minimum of six (6) weeks before planting at the job, and such fact shall be certified on accompanying invoices.
4. Balls shall be firmly wrapped with burlap or approved, strong cloth. All burlap and approved, strong cloth shall be organic and biodegradable.
5. The rootballs of these plants shall be properly protected until planting.

G. Turf Materials:

1. Gross sod: As indicated on the plans.
2. Gross seed: As indicated on the plans.

2.2 SOILS, FERTILIZERS & SOIL CONDITIONERS

A. Topsoil:

1. The LC shall provide Loamy Sand to Sandy Loam (according to UDSA Textural Triangle) topsoil that is:

    a. Natural surface soil from well-drained areas, fertile, friable, reasonably free of weeds, without muck, and typical of productive cultivated topsoils of the locality.
    b. With a pH range of 4.5 to 7.2; not excessively acid or alkaline nor containing toxic substances. Acceptable pH range for Bahia and Centipede grass would be 5.0 to 6.0 and for St. Augustine or Zoysia grass would be a pH range of 6.5 to 7.0.
    c. Without admixture of sub-soil and reasonably free of clay, stones, stumps, clods, sticks, roots, or other objectionable extraneous matter or debris one inch (1") or more in diameter, or any other object which may be a hindrance to the finished grading operation.
    d. Consisting of minimum ten percent (10%) organic matter, if imported.
    e. With a Bulk Density of 1.0-1.6 g/cm^3 (62-100 lbs/ft^3).
    f. With a Percolation rate of 4-8 in/hr for all landscape areas except specifically designated wetlands or xeric areas.
    g. With textural analysis/ structure / mineral content of Clay = 5-15%; sand = 70%-90%; Silt = 0%-20%. (This will be referred to as “Base Mineral” topsoil, herein).

h. With an organic content of 3.5% to 10%. (see section 2.2.D for compost specifications).

2. No topsoils obtained by stripping agricultural land, bogs, or marshes shall be imported. Only soil obtained or displaced through construction or mining activities may be used.

B. Prepared Planting Mix:

1. Topsoil may be stockpiled, reused, onsite surface soil, from the “O” and “A” horizons; that meets the criteria specified above and on the planting plans.
2. Natural or manufactured / blended soil may be imported for use as planting soil where it, meets the criteria specified above and on the planting plans and contains no materials toxic to plant growth.
3. If Soil Test Reports indicate deficiencies in existing base mineral topsoil, from the site, or imported topsoil, the LC shall provide amendments based upon the recommendation of a certified soil testing laboratory to meet the specifications, above, and on the planting plans.
4. Where on-site, native soil meets the above specifications; planting bed soil and backfill mix may be manufactured by uniformly incorporating compost and other ammendments into the native base mineral soil, at the assigned mixing area, or within the bed and to a depth of 6 to 8 inches.
5. See Section 1.5.B concerning protection of select soils.
6. Soil mixture used for planting shall conform to 2.2(A), with minimum ten percent (10%) organic matter.
7. Annuals Plant Mix, placed as a growing medium for all annuals, perennials, and Lantana, Bromeliads, and Anthuriums shall consist of: 1/2 clean, coarse-grained sand, 1/4 approved Sphagnum Canadian Peat Moss, 1/8 fine milled composted pine bark and 1/8 vermiculite; or approved equal.
8. The LC shall be responsible for providing adequate acceptable soil to prepare his planting mixture. The LC is responsible for supplying and mixing soil amendments and moving the planting mixture to the plant pits and beds.
9. Control mix deviation shall not exceed ten percent (10%). Should a higher degree of variation be found, the LC shall make correction as directed by the Owner or Owner's designated representative, with conformance tests repeated until the mix meets specifications for pit backfill and soil preparation.

C. Fertilizer:

1. The LC shall provide a complete commercial fertilizer mixture complying with the laws regulating the sale and manufacture of fertilizer in the State of Florida and specified by a soil testing laboratory to meet the criteria listed above and on the planting plans.

2. The LC shall follow any and all state and local fertilizer ordinances.

D. Soil Conditioners

1. pH Adjustment:

a. Dolomitic Limestone Approved product designated for agriculture use.
b. Elemental Sulfur: Manufacturer's standard commercial grade.
c. Component to be recommended by soil laboratory and approved by the Owner or Owner's designated representative.

2. Compost: Unless otherwise directed by the certified agricultural testing laboratory, compost media shall reflect the preferred range of parameter characteristics presented by the U.S. Composting Council and be a well decomposed, stable or highly stable, weed free organic matter source derived from agricultural, food, or industrial residuals; biosolids (treated sewage sludge); yard trimmings; source-separated or mixed solid waste. For tree, shrubs, and groundcover areas, ninety-eight percent (98%) of the product shall pass through a ¾ inch screen, while 100% of the product shall pass through a 3/8 inch screen for turf areas. Compost shall possess a pH of 6.0 to 8.5 and moisture content of 30% to 60% by dry weight. It shall contain no substances toxic to plants and man-made foreign matter of 1 % or less by dry weight. The compost will possess no objectionable odors and shall not resemble the raw material from which it was derived. A compost sample and testing laboratory specification shall be submitted to the LA for review, prior to being used. Other recommendations provided by the U.S. Composting Council's Landscape Architect Specifications for Compost Utilitzation shall be consider for relevance.
3. Sphagnum Canadian Peat Moss: Suitable for plant growth, capable of sustaining vigorous plant growth, and specifically pulverized for agricultural use. Peat shall be free of deleterious materials that would be harmful to plant growth, shall be free of nematodes, shall be of uniform quality, and shall have a pH value between 5.5 and 6.5 (as determined in accordance with ASTM E70). Peat shall be sterilized to make free of all viable nut grass and other undesirable weeds.
4. Soil Fumigants: As recommended by applicable Agricultural Public Agencies and in accordance with product labeling.
5. Planting Mix Sand: Clean, washed (according to ASTM C33) coarse-grained (0.5 mm or greater) sand, free of substances harmful to growth of plants.
6. Water: Free of substances harmful to growth of plants. Water shall also be free of staining agents as well as elements causing odors.

2.3 MISCELLENOUS MATERIALS

A. Herbicides: As recommended by applicable Agricultural Public Agencies and in accordance with product labeling.

B. Mulch for Planting Areas: Top mulch in planting areas shall be free of deleterious materials, debris, insects, and weed seed and shall consist of shredded Medium Pine Bark Nugget mulch (2"-3" Nugget) specified on plans. Submit sample for review by LA and prior approval by the Owner or Owner's designated representative.

C. Guying and Staking Material:

1. Wood stakes, braces, and battens for tree and Palm staking shall be as follows, or approved equal:

a. Construction-grade lumber, pressure-treated Pine.

b. Vertical stakes: Nominal two-inch (2”) diameter x eight feet (8’) long minimum, pressure-treated wood stakes, and pointed at one (1) end.
c. Braces for Palm trees: Nominal 2”x4”x8’ long minimum, pressure-treated lumber.
d. Anchor stakes: Nominal 2”x4”x3’ long, pressure-treated Pine, and pointed at one (1) end.
e. Battens for Palm trees: 2"x6"xl2" long minimum, pressure-treated lumber.

2. Bonding to secure battens and burlap to Palm trees shall be as follows, or approved equal:

a. Galvanized-steel bands of sufficient size to tightly secure battens and burlap to tree trunk.
b. Reinforced-nylon ties of sufficient size to tightly secure battens and burlap to tree trunk
c. NO nails, screws or other securing devices may be driven into the trunk.

3. Guying: Wires shall be as follows, or approved equal:

a. Annealed, galvanized iron, or galvanized-steel, ten- (10) gauge wire,
b. Each wire shall be demarcated with white surveyor's tape above and below hand tensioner.

4. Friction guards shall be as follows, or approved equal:

a. New minimum one-half inch (1/2") inside diameter, two- (2) ply, reinforced, block rubber or plastic hose.
b. Minimum length: Six inches (6”).

5. Hand tensioners shall be as follows, or approved equal:

a. Turnbuckles: Galvanized-steel, six inches (6”) long.
b. One (1) turnbuckle per guy wire is required.

6. Tree wrapping shall be as follows, or approved equal: First-quality, heavy, waterproof crepe paper manufactured for tree wrapping, or approved equal.

7. Burlap for protecting Palm tree trunks shall be as follows:

a. Tight-knit, natural-fiber burlap.
b. New burlap, free of mold, dirt, holes and burn marks.

PART 3 - EXECUTION

3.1 INSPECTION

A. Before proceeding with any work, the LC shall carefully check and verify all dimensions and quantities, and immediately inform the LA and the Owner or Owner's designated representative of any discrepancies between the Drawings, Specifications, and actual conditions. The LC shall not perform work in any area where there is a significant

discrepancy until approval to proceed has been received from the LA or the Owner or Owner's designated representative.

B. Verify that plants to remain undisturbed have been clearly identified and protected from injury during construction. If not, identify and protect plants to remain according to approved procedures set forth in local ordinance. Any existing plant beds or trees damaged by construction activity shall be replaced by the responsible party at their own expense.

C. The LC shall verify that rough grading has been completed and there are no errors that will result in poor application or cause latent defects in fine grading and sodding.

D. The LC shall accept job site elevations at plus/minus two/tenths (±0.20) of a foot from finish-grade elevations.

3.2 PREPARATION

A. General: Within the entire area to be landscaped and/or sodded as shown on the Drawings, the LC shall complete the following site topsoil preparation items to eradicate all existing weed and/or natural groundcover and assure proper topsoil depth, quality and grade. The LC shall initiate site topsoil preparation as stated herein and coordinate all work with the existing underground sprinkler system, electrical lines, etc.

B. Topsoil:

1. The LC shall provide minimum eight (8) samples for laboratory testing of topsoil in prepared landscape planting areas to assure compliance with recommendations and requirements of the Contract Documents. Additional tests may be made at the discretion of the LC to clarify or verify topsoil needs but are not required by the Owner. Areas of testing and quantity of tests shall be as directed by the LA, clearly delineated on a site plan, and submitted to the LA and the Owner or Owner's designated representative.

    a. Shrub and groundcover bedding areas shall be tested separate from lawn areas, natural areas, wetland areas, etc. Sample depths shall be 4”-6” deep for shrub areas and 2”-3” deep in lawn areas, unless otherwise recommended by soils testing laboratory.
    b. LC shall follow the recommendation of the soil testing laboratory for sample extraction, mixing, drying, etc. Otherwise, follow current recommendations of the cooperative extension service.
    c. Areas of testing and quantity of tests shall be as directed by the Owner or Owner's designated representative, clearly delineated on a site plan, and submitted to the LA and the Owner or Owner's designated representative for approval.
    d. LC shall verify that test laboratory is aware of species with special needs, such as palms, so that nutritional requirements are considered in laboratory recommendation.
    e. Particular care should be taken to remove pieces of mortar, cement, wood and other similar construction debris, refuse and other deleterious material from all planting areas.

2. Particular care should be taken to remove pieces of mortar, cement, wood and other similar construction debris, refuse and other deleterious material from all planting areas.
3. If stockpiled, on-site or imported soil characteristics meet these specifications and plans, soil shall be protected from compaction and contamination until applied to planted areas, without further amendments. See Section 1.05.B (Protection).
4. If Drawings provide no further detail, soil shall be removed to a depth of nine inches within twelve feet from any building, street or parking edge or curb. See Section 1.5.B concerning protection of select soils. If any of these soils meet 2.2.A.1, above, they may be stockpiled separately for use in topsoil mix.
5. When proposed “special soils” areas are indicated on plans, soil shall be removed to a minimum depth of nine inches. If not contaminated, these soils may be stockpiled separately from other soils and considered for “base mineral” soils use in creating the special soils mix.
6. If soil tests reveal no deficiencies LC may proceed with plant installation. (See Section 1.3.F).
7. If Soils test(s) reveal deficiencies in onsite topsoil characteristics, the LC shall follow the recommendation of a Certified Soil Testing Laboratory to bring characteristics into line with landscape specifications and plans by mixing in prescribed materials with uncontaminated base minerals.
8. All soil mixing procedures shall be done in a designated soil mixing area; not within planting beds. See Section 1.05.B (Protection).
9. All soil mixes shall be well-blended to provide a uniform distribution of all amendments. See section 2.2.A.1, above.
10. Do not place topsoil when subsoil is frozen, excessively wet, or otherwise detrimental to work.
11. Immediately prior to backfilling topsoil mix from stockpiled or imported source, LC shall scarify the soil surface of the bottom and sides of the excavated planting area pit with a pick or hard rake.
12. In areas outside of “special topsoil areas”, in order to bring final topsoil product into conformance with the organic content, textural composition, and pH specified for the topsoil mix, components shall be uniformly mixed with the base mineral soil, as recommended by the Certified Soils Testing Laboratory, to a depth of 6”-8”.
13. If soil pH and base mineral composition are acceptable, but organic content is below 3.5%; the LC may uniformly mix organic compost media to bring the organic content up to 10%. Media shall be tilled in to a depth of 6 to 8 inches or combined with stockpiled soil in the assigned mixing area. Do not mix soils the within the area of protected stockpile.
14. LC shall avoid excessive compaction of planting mix / backfill material.
15. Rough grade shall be low enough to accommodate proposed soil amendments, plant root balls and mulch. Finished grades indicated on the grading plans shall be assumed to be top of mulch elevations. Soil removed for the tree and landscape planting shall not cause finished grades to be higher than designed on grading plans and shall be removed from site.

C. Post Emergence Herbicide: Apply “Roundup” as manufactured by Monsanto Corp., or approved equal, according to manufacturer’s recommended rate and specification within the limits of all areas to be landscaped. Protect existing plants from overspray. The LC shall ensure total eradication of all existing weed and/or natural groundcover of all areas

to be landscaped within the project area prior to proceeding with site clearing and/or tillage.

1. Existing sod areas or seeded areas may be stripped as required by the LC. Off-site disposal of excess materials shall be the Contractor's responsibility.
2. Comply with all applicable codes and laws for use of herbicides around water.

D. After all areas have been treated with post emergence herbicide and its effective period (as determined by the manufacture) has expired, the LC shall thoroughly clear and properly disposed of all remaining treated existing weeds and/or groundcover, stumps, stones larger than 2" in diameter, roots, cable, wire, and all other debris or materials that may hinder proper grading, tillage, planting, or subsequent maintenance operations off site.

E. Soil amendments:

1. The LC shall be responsible for providing adequate acceptable soil to prepare his planting mixture. The LC is responsible for supplying and mixing soil amendments "as needed" to obtain specified topsoil characteristics and moving the planting mixture to the plant pits and beds.
2. Where needed, adjust pH of soil, with additives recommended by certified soil testing laboratory, prior to applying compost media. Soil amendments shall be added to any soil used for planting and in planting beds and plant pits in the amount and manner indicated by an approved soil analysis to obtain a pH appropriate for plants to be installed.
3. If site is undistrubed by construction and soil only requires additional organic matter; one-half (½") inch of topsoil may be removed for each inch of prescribed compost media and Compost Media shall be applied and tilled into soil to a depth of six inches (6") in bed areas and three inches (3") in lawn areas. Otherwise, LC may mix soil and compost media elsewhere on site, apply planting mix to bed areas, and compact soil to reflect grades indicated on grading plans.
4. If not otherwise specified by certified soils testing laboratory, backfill mix for trees shall consist of the specified compost, mixed with specified sand at a ratio of one (1) part sand to four (4) parts compost media, prior to combining with existing site soil at a ratio of two (2) parts site soil with one (1) part modified compost media. See Bulk Density requirements.
5. Annuals Plant Mix, placed as a growing medium for all annuals, perennials, and Lantana, Bromeliads, and Anthuriums shall be applied to a depth of six inches (6").

F. Finish Grading:

1. The LC shall grade all lawn and planting areas to a smooth, even and uniform plane with no abrupt change of surface to establish the correct finish grades, to within ½ inch. LC shall ensure a topsoil depth, below finish grade, of minimum 2" for sod/seed areas and minimum 6" depth for bed areas. If soil conditioners are required, based on soils laboratory tests and recommendations, they shall be incorporated as prescribed prior to final grade completion and shall not change desired finished grade.

2. The LC shall provide positive surface drainage in all areas.

a. The LC shall not work soil when moisture content is so great that excessive compaction will occur nor when it is so dry that dust will form in the air.
b. The LC shall apply water in a fine spray, if necessary, to provide ideal moisture for filling and for planting as herein specified, without washing away or eroding soil.
c. The LC shall properly grade low spots and pockets to drain to established drainage structures.

3. Elevation of finish grade in all areas adjacent to pavement shall be two inches (2") below grade of pavement for turf and three inches (3”) below grade of pavement for plant beds.

4. The LC shall be provided with a complete copy of the civil construction documents for his use in reviewing existing grading and to use in restoring the areas impacted by their work. The LC shall contact the Owner for the plans.
5. The LC shall reestablish grade levels where settlement, erosion, or other grade changes occur from the point in time when the respective area is turned over to the LC. The LC shall adjust grades, as necessary, to provide positive drainage.
6. The LC shall remove or redistribute excess soil before application of fertilizer.

G. Layout and Spacing:

1. The LC shall layout areas for multiple plantings and stake locations for individual trees and shrubs. In the event that underground utilities or other obstructions are encountered during planting, relocate and replant materials at alternate locations as directed by the LA or the Owner or Owner's designated representative.
2. The LC shall place and plant all plant materials in the location, spacing, and orientation provided in the design specifications. The LC shall make adjustments as directed by the LA or the Owner or Owner's designated representative, if necessary, to achieve project design objectives.

a. When plant material is spaced in rows, the LC shall verify all dimensions and space plants equally within the designated areas. The LC shall adjust quantities as required. Rows shall be placed parallel to curbs.
b. Where plant material is indicated in an informal pattern, the LC shall space the material as indicated, maintaining consistent spacing with proper consideration for trees, irrigation sprinkler patterns, light standards, and other features.

3. The LC shall space ground cover material triangularly in straight rows at the spacing indicated on the drawings.
4. The LC shall set shrubs that are to be located adjacent to sidewalks or sod edges back from the edge to a distance equivalent to the 'on-center' dimension of that specific shrub.
5. When trees are to be planted prior to construction of finish grades, the LC shall be responsible for locating the position and finish-grade relationship to the top of the rootball.

3.3 PLANTING

A. General:

1. The quantities given in the plant list are approximate only, and the LC shall verify, furnish, and plant all the plants required to complete the work shown on the drawings and in the specifications at no additional cost.
2. All plant material shall be reviewed and receive initial approval from the LA and/or the Owner or Owner's designated representative prior to its delivery to the job site, as deemed necessary by the LA and/or the Owner or Owner's designated representative. Tagging of representative samples of trees and/or shrubs by the LA does not constitute Final Acceptance of the remaining trees and/or shrubs that the LC is responsible for tagging.

    a. The approval methods will be by nursery site visits or by photographs as set forth under Part 1.4, ‘Submittals', herein.
    b. Approval of plant materials at this stage will not constitute Final Acceptance. Approval for all materials will be given only at the time of Final Acceptance by the Owner or Owner's designated representative.

3. The LC shall not perform any planting until all operations involved with the installation of the irrigation system have been completed, final grades have been established, and the planting areas have been properly graded and approved.
4. The relative location of each tree and plant is subject to approval by the LA or the Owner or Owner's designated representative and will, if necessary, to achieve project design objectives, be relocated as directed.
5. Planting beds shall be treated with a USEPA approved pre-emergent herbicide prior to installation of plant material. LC shall follow manufacturer’s specifications for application rates.
6. The LC shall ensure adequate vertical drainage in all planting areas. Vertical drilling, through any compacted fill to native soil shall be accomplished to ensure drainage.
7. The LC shall fill all tree pits with water to test proper drainage percolation prior to planting. The LC shall excavate pits that are found to be inadequately draining to a depth sufficient for proper drainage and backfill with coarse sand. No allowances will be made for plants lost due to improper installation and drainage. If the LC cannot meet proper vertical drainage conditions, contact the LA or the Owner or Owner's designated representative immediately.
8. The LC shall dig each plant pit 24" wider than the diameter of the tree rootball (and 12" wider than diameter of shrub rootball). When hardpan or muck is encountered, the LC shall break through to clean sand and backfill with planting soil except when planting special wetland areas. The LC shall loosen compacted soil at the sides and bottom of the plant pits by scarifying or other approved method.
9. The LC shall remove each plant from its container, scarify the roots on the sides and bottom, and plant as specified on detail drawing or in such a manner that when settled it will bear the same relation to the constructed finish grade as it bore to the grade in the container before being transplanted.

    a. Filling will not be permitted around trunks and stems.
    b. Cut and remove all wire and synthetic rope used on rootball.

c. Install all plants in plumb position unless specified otherwise by plan.
d. In areas where utilities exist, the LC shall be required to hand dig plant pits.

10. Backfill procedure:

    a. The LC shall place and firmly tamp or water jet planting soil around plant to eliminate air pockets. Backfill halfway up around the rootball, equally space AgriForm tablets adjacent to the rootball, then backfill remainder.
    b. The LC shall form a shallow watering basin around plants to hold enough water to saturate the rootball and prepared plant mix. The LC shall maintain watering basins until Final Acceptance.

11. The LC shall remove each plant from its container, scarify the roots on the sides and bottom, and plant as specified on detail drawing or in such a manner that when settled it will bear the same relation to the constructed finish grade as it bore to the grade in the container before being transplanted.
12. The LC shall water plants thoroughly after planting and backfill all voids which develop with planting soil mix to bring to finish grade.
13. The LC shall prune, at the time of planting, with due regard to the natural forms and growth characteristics of each species.
14. Pruning shall be done in a manner complying with standard horticultural practices and shall be limited to the minimum necessary to remove injured twigs and branches and to compensate for the loss of roots during transplanting. Pruning shall not result in the removal of more than one-third (1/3) of the branching structure, nor shall pruning result in alterations to the basic plant structure. Broken or damaged roots shall be cut off smoothly.
15. Guying, staking, and wrapping: All trees shall be staked, unless specific approval for its omission is obtained from the LA. Guying and staking of trees will not relieve the LC of the responsibility of resetting plants after they have been blown over, nor will it relieve him of the responsibility for the plant guarantee if the plants die as a result of being blown over. Braces will not be attached to the tree with nails. Any method of bracing, other than those set forth in the drawings and specifications, must receive prior approval from the LA or the Owner or Owner's designated representative before installation.
16. The LC shall be responsible for supplemental hand watering of trees and shrubs irrigated by rotor/spray heads as needed, to ensure plant vigor and viability, but not less than three (3) times weekly until Final Acceptance. Each time plants are watered, they shall be watered so as to completely saturate the rootball to its full depth, to ensure adequate moisture.
17. Place mulch between and around specified trees and all shrubs within five (5) days after any planting. For individual trees outside of planting beds, spread mulch to cover the saucer area (a minimum of 18” to 24” from tree trunk).
18. Plantings shall be located not less than five feet (5') back from electrical transformers. Maintain a ten-foot (10') clearance for transformer doors.
19. Disposal of excess soil: Use acceptable excess excavated topsoil to form watering basins around trees and palms. The LC shall dispose of excess soil off-site or as directed by the Owner or Owner's designated representative. Finish grade shall be maintained to ensure proper surface drainage away from buildings, etc. Excess soil, generated by planting pits, may not be spread over graded areas, except as subsoil for berm construction.

20. If any tree, shrub, or plant bed settles more than two inches (2") below the established finish grade, it shall be raised to the proper level by the LC and not merely filled with additional planting soil.
21. After all planting and finish grading have been completed, the LC shall top-dress all ground cover areas with three inches (3") of mulch as specified under Part 2 - Products. Finish grade including mulch shall be no more than one inch (1") below pavement elevation. Mulch shall not cover any portion of plant.

B. Planting Container-Grown Trees:

1. LC shall comply with 3.3(A) 'General'.
2. The LC shall maintain plants in nursery containers or properly heeled-in until time for transplanting.
3. Can/container cutting: The LC shall open canned/container stock by cutting can vertically on two (2) opposite sides of the can with an instrument appropriate for the purpose. An ax or spade will not be permitted.
4. The LC shall handle all plants by root ball or container only. Handling by the trunk or branches of the plant itself will be cause for rejection. Trees with broken root balls will be rejected.
5. The LC shall layout areas and set stakes for trees at locations indicated on the drawings. The LC shall secure approval from the LA or the Owner or Owner's designated representative before excavating plant pits. The LC shall make necessary adjustments as directed.
6. All proposed trees shall be installed by the LC either entirely in or entirely out of planting beds. Planting bed lines are not to be obstructed.
7. The LC shall remove containers from plants and lightly scarify roots before replacement in ground. The LC shall set each tree in the center of the pit in a plumb, vertical position so that crown of ball will be two - three inches (2"-3") above finish grade. Rotate to obtain best visual appearance and proper relationship to nearby buildings and adjacent plants. The LC shall hold in position until the planting mixture has been flushed into place with a slow, full-hose stream of water, and settled into place. The LC shall backfill all voids that develop with additional planting soil to bring to finish grade.
8. Fertilizer: See 2.2 (C), above, and 3.4, below.

C. Planting B&B and WB&B Trees and Large Shrubs:

1. LC shall comply with 3.3(A) 'General'.
2. The LC shall install the plant rootball in the pit, with burlap intact, on undisturbed sub-grade that has been hand tamped.
3. The LC shall remove the binding from planting ball and lay the top of burlap back six inches (6"). For wire-balled trees, the LC shall remove the wire from the top one-half (1/2) of the ball (eighteen inches (18") minimum) and pull the burlap back after the plant has been stabilized by partially backfilling the planting pit.
4. The LC shall not pull wrapping from under the planting ball.
5. The LC shall not plant if the planting ball is cracked, broken, or showing evidence of voids before or during planting process. The LC shall replace the plant with one of the same species, size, and specification at no cost to Owner.
6. Fertilizer: See 2.2 (C), above, and 3.4, below.

D. Tree Staking:

1. The LC shall be responsible for staking all trees in accordance with the Contract Documents.

2. The LC shall be responsible for maintaining staked trees and Palms in a plumb condition.

3. The LC shall be responsible for keeping taut all guyed plant material. The method of tightening guy wires shall be approved by the LA. Guying shall be tightened as needed, but within one (1) day of when necessary.
4. Where trees are shown to be installed in pavement area cut-out planters, some of which may be fairly small in overall dimension, the LC shall adjust the tree staking detail as necessary. Stakes and guy wires shall be contained within the cut-out planter area and braced against the turned-down concrete slab.

E. Planting of Shrubs and Vines:

1. LC shall comply with 3.3(A) 'General'.
2. The LC shall plant shrubs and vines in pits at least twelve inches (12") greater in diameter than their rootball. When the plant has been properly set, the LC shall fill the pit to the finish grade with planting mix (re: 2.1(B)) and thoroughly settle by tamping and watering.
3. The LC shall remove all vines from stakes and securely fasten vines to the wall, fence, or other surface next to which they are planted in a manner approved by the LA or the Owner or Owner's designated representative.
4. Fertilizer: See 2.2 (C), above, and 3.4, below.

F. Planting of Groundcover, Perennials and Annuals:

1. LC shall comply with 3.3(A) 'General'.
2. The LC shall moisten ground cover areas prior to planting. Do not set plants in dry soil.
   a. The LC shall not allow rooted plants to dry out before or during planting.
   b. Wilted plants will not be accepted.
3. The LC shall space ground cover plants as shown in the plant schedule on the drawings.
4. Annual/ perennial beds shall be raised, if necessary, to insure excellent drainage. LC shall till the bed area to a minimum depth of 6".
5. Ground cover plants that have been grown in liners are to remain in liners until time for transplanting.
6. The LC shall plant rooted cuttings sufficiently deep to cover all roots.
7. After planting, the LC shall firm-up the earth around each plant sufficiently to force out all air pockets.
8. Fertilizer: See 2.2 (C), above, and 3.4, below.

G. Sodding Lawns:

1. Lawns shall be planted with the sod indicated on the planting plans and specifications. The LC shall certify all sod to be of high quality (see 1.3(B)).
2. Extent of sod to be verified by LC in field. Additional sod required will be adjusted utilizing square-footage unit price. Additional billing to be approved by Owner.

3. The LC shall not sod areas until the planting of trees, shrubs, and other plants are sufficiently completed in that area to eliminate the possibility of incurring damage to the lawn areas by tree and shrub planting operations.
4. The LC shall incorporate amendments specified by soils testing labratory and fine grade to remove irregularities.
5. Depth of Top Soil in areas to be sodded shall be minimum three inches (3").
6. The LC shall treat soil, as necessary, with approved fumigant or herbicide to control weeds.
7. Leveling:

    a. The LC shall clear the surface of all stones and other objects, larger than one inch (1") in thickness or diameter, and all roots, weeds, brush, wire, and any other objects that might be a hindrance to future maintenance operations.
    b. The LC shall level out all undulations and irregularities in the surface resulting from tillage, fertilizing, liming, or other operations. The LC shall lightly roll to firm surface and regrade, as necessary, to even base grade.
    c. During rolling, soil should be sufficiently dry to avoid dense compaction.
    d. Finish grade shall be adjusted so sod root zone shall be 1/2" - 1" below adjacent pavment, top of curbs, etc.
    e. All surfaces shall drain to drainage devices provided without puddling or ponding.

8. The LC shall pre-irrigate soil to wet it to a depth of two inches (2"). Soil should be damp, but not muddy.
9. The LC shall lay sod within twenty-four (24) hours after being cut. Do not expose sod to sun longer than necessary.
10. The LC shall roll out sod or lay squares (preferably 12"x24") carefully. Use a 2'x4' laid on its side as a "kicker" to butt against sod strips and force them into place. Sod squares shall be fitted together tightly so that no joint is visible.
11. The LC shall stagger or offset all joints between sod sections.
12. The LC shall lay sod parallel to the contour of any slopes. Sod shall be peggged on slopes with a gradient of more than 4:1 with a minimum of two (2) stakes per square yard.
13. The LC shall cut sod with a sharp knife or spade to conform to walks, planter beds and other elements.
14. The LC shall roll sod, with roller weighing no more than 150 pounds per linear foot of roller width, to ensure new sod achieves close contact with the soil.
15. The LC, to ensure a well executed design, shall lay sod in a manner which produces neat, clean lines along beds, pavement, etc.
16. After laying and rolling sod, the LC shall water area thoroughly and deeply.

    a. The LC shall keep sod well watered during the first two (2) weeks after installation to insure good rooting into base soil.
    b. The LC shall supplement watering from irrigation system by hose, as necessary, to assure adequate water to berms and other critical areas to establish sod.

17. The LC shall not sod within five feet (5') of existing tree trunks 24+" D.B.H. or within three feet (3') for trees less than 24" D.B.H..
18. Fertilizer: See 2.2(C). Apply granular fertilizer at manufacturer's recommended rate, five (5) days after installing sod.

3.4 MAINTENANCE

A. Maintenance:

1. Beginning immediately after planting, the LC shall maintain trees, shrubs, ground cover, sod, and other plants until Final Acceptance. The Owner reserves the right to back charge for maintenance required that the LC either through omission or neglect does not perform or does not perform in a timely manner.
2. Maintenance shall include, but not be limited to: watering, pruning, repairing washouts, removing debris and dead branches, weeding, maintaining mulch level, mowing, edging, tightening and repairing of guys, replacement of sick, dying, or dead plants, resetting plants to proper grades or upright positions, restoration of the planting saucer or plant bed, and all other care needed for the proper growth of the plant material. The LC shall continuously protect all areas including lawns, plant materials, supports, etc. until Final Acceptance of the work.
3. The root system of plants shall be watered by the LC as often as conditions require at such intervals as will keep the surrounding soil in best condition for promotion of root growth and plant life. Supplemental hand watering in addition to the irrigation system watering is the responsibility of the LC until all plant materials are well established. Water when soil moisture is below optimum level for best plant growth. Coordinate and adjust timing of irrigation system with the Irrigation Contractor. The LC shall note that the irrigation system is not designed to accommodate establishment of trees and Palms. It is the LC's responsibility to provide additional water as may be required above what is supplied by the irrigation system until all trees and Palms are well established. The LC shall report irrigation problems/leaks as soon as possible to the Owner or Owner's designated representative and LA.
4. The LC shall keep planting saucers and beds free of weeds (grasses and other undesirable vegetation growth). All areas shall be ninety-eight percent (98%) weed free upon Final Acceptance by Owner.
5. Warranty (see 1.6). During the warranty period, and until its completion date, any plant that is dead or not in satisfactory condition, as determined by the LA and/or the Owner or Owner's designated representative, shall be removed and replaced by the LC. Plants replaced shall be inspected and accepted and than guaranteed for an additional six (6) months after the new acceptance date. All plant replacements shall be of the same kind and size as specified in the plant list. They shall be furnished and planted as specified herein. The cost shall be the responsibility of the LC.
6. If “Final Acceptance” has not been granted within two (2) months of initial installation, the LC shall provide one and one-half (1.5) pounds of specified fertilizer per one-hundred (100) SF of planted area.
7. Spraying and dusting:

    a. During the maintenance period and up to Final Acceptance by the Owner or Owner's designated representative, the LC shall perform all seasonal spraying and dusting of trees and shrubs.
    b. The LC shall use materials and methods in accordance with the highest nursery standards and practices and as directed by the LA or the Owner or Owner's designated representative.

3.5 CLEAN UP AND PROTECTION

A. Clean Up:

1. The LC shall remove litter or other debris occurring from maintenance operations on a daily basis.
2. During the landscape work, the LC shall store materials and equipment where directed. The LC shall keep pavements clean and work area in an orderly condition.
3. Upon completion of installation, the LC shall remove all excess subsoil, cordage, wrappings, and other extraneous materials from the site. The LC shall remove all tools, equipment, and other materials, except those necessary for maintenance work.

B. Protection: see 1.5(B).

3.6 SUBSTANTIAL COMPLETION AND FINAL ACCEPTANCE PROCEDURES

A. Substantial Completion Procedure:

1. Review of the entire project shall be made upon written request of the LC. The written request for review shall be accompanied by the LC's list of items remaining to be completed or corrected.
2. If all work is satisfactory and complete according to the conditions of the contract, the LA and/or the Owner or Owner's designated representativeshall declare the work substantially complete.
3. Prior to final approval of work, the LC shall perform the following:

    a. Re-sod areas where necessary for full and even coverage.
    b. Remove all debris from landscape areas.
    c. Adjust irrigation heads, where necessary, to maintain proper vertical positioning.
    d. Fill all depressions and eroded channels with sufficient soil mix to adjust grade to assure proper drainage, compact-lightly, and replant the filled areas in accordance with the drawing's requirements.
    e. Tighten and adjust all tree guy wires.
    f. Remove watering rings and restore mulch around trees unless otherwise noted by the Owner or Owner's designated representative.
    g. Perform any other operations necessary to complete maintenance and ensure that plants are healthy, vigorous, visually pleasing, and undamaged.

4. Upon review of all landscape work, the Owner or Owner's designated representative and LA shall approve or disapprove the Final Acceptance of the contract in writing. Partial Final Acceptance may be given to the LC, at the Owner's discretion, providing the unacceptable work is corrected immediately thereafter.
5. If the materials are in whole or substantially acceptable at the time of the inspection, a written notice will be given by the Owner or Owner's designated representative stating that the final maintenance period and warranty period begins effective the date of the inspection.

6. After the inspection for Final Acceptance, written acceptance will be given by the Owner for all work of this section, exclusive of possible replacement of plants

subject to warranty. If any deficiencies of requirements exist, they will be noted in writing.

7. Upon written acceptance being given, the Owner will assume all responsibilities for maintenance of landscape work.
8. At the conclusion of the warranty period, an inspection will be made by the Owner or Owner's designated representative to determine the condition of warranted plant material.

    a. The LC shall remove all plant material noted as not being in a healthy-growing condition.
    b. At no additional cost, the LC shall replace noted plant material during the following planting season with material of like kind and size in accordance with specifications for original planting.
    c. The warranty period applies also to replaced material and warranty period will commence upon planting.

9. Furnish all warrantees, maintenance procedures, “As Built” record drawings, and all required closeout documents.

3.7 PAYMENT

A. Payment for all landscaping shall be included in the Pay Item TB-1, Terminal Building, Complete.

END OF SECTION 02900

SECTION 520

CONCRETE GUTTER, CURB ELEMENTS, AND TRAFFIC SEPARATOR

520-1 Description.
Construct portland cement concrete curb. Curb will include concrete curb and gutter, concrete traffic separator, valley gutter, special concrete gutter, curb for sidewalk curb ramps and driveways, and any other types of concrete curb not specified in other Sections.

520-2 Materials.

520-2.1 Concrete: Use concrete meeting the requirements of Section 347.

520-2.2 Reinforcement: For all steel reinforcement required by the Plans, meet the requirements of Section 415.

520-2.3 Joint Materials: Meet the requirements of Section 932.

520-3 Forms.

520-3.1 Form Materials: Construct forms for this work of either wood or metal. Provide forms that are straight, free from warp or bends, and of sufficient strength, when staked, to resist the pressure of the concrete without deviation from line and grade. For all items constructed on a radius, use flexible forms.

520-3.2 Depth of Forms: Ensure that forms have a depth equal to the plan dimensions for the depth of concrete being deposited against them.

520-3.3 Machine Placement: The Contractor may place these items by machine methods with the approval of the Engineer provided that the Contractor consistently produces an acceptable finished product, true to line, grade, and cross section.

520-4 Excavation.
Excavate to the required depth, and compact the foundation material upon which these items are to be placed as specified in 120-9.

520-5 Placing Concrete.
Place the concrete in the forms, and tamp and spade it to prevent honeycombing, and until the top of the structure can be floated smooth and the edges rounded to the radius shown in the Plans.

520-6 Joints.

520-6.1 Contraction Joints: Except for machine placed items, the Contractor may form joints by using dummy joints (either formed or sawed) or by using sheet metal templates. If using sheet metal templates, ensure that they are of the dimensions, and are set to the lines, shown in the Plans. Hold templates firmly while placing the concrete. Leave templates in place until the concrete has set sufficiently to hold its shape, but remove them while the forms are still in place.

Saw contraction joints, for machine placed items, unless the Engineer approves an alternate method. Saw the joints as soon as the concrete has hardened to the degree that excessive raveling will not occur and before uncontrolled shrinkage cracking begins.

Space contraction joints at intervals of 10 feet except where closure requires a lesser interval, but do not allow any section to be less than 4 feet in length.

520-6.2 Expansion Joints: Construct expansion joints at all inlets, at all radius points, and at other locations indicated in the Plans. Locate them at intervals of 500 feet between other expansion joints or ends of a run. Ensure that the joint is 1/2 inch in width.

520-7 Finishing.

520-7.1 Repair of Minor Defects: Remove the forms within 24 hours after placing the concrete, and then fill minor defects with mortar composed of one part portland cement and two parts fine aggregate. The Engineer will not allow plastering on the face of the curb. Remove and replace any rejected curb, curb and gutter, or valley gutter without additional compensation.

520-7.2 Final Finish: Finish all exposed surfaces while the concrete is still green. In general, the Engineer will only require a brush finish. For any surface areas, however, which are too rough or where other surface defects make additional finishing necessary, the Engineer may require the Contractor to rub the curb to a smooth surface with a soft brick or wood block, using water liberally. Also, if necessary to provide a suitable surface, the Engineer may require the Contractor to rub further, using thin grout or mortar.

520-7.3 Imprinted Concrete: Install imprinted concrete as shown in the Plans.

520-8 Curing.

520-8.1 General: Continuously cure the concrete for a period of at least 72 hours. Commence curing after completely finishing and as soon as the concrete has hardened sufficiently to permit application of the curing material without marring the surface. Immediately replace any curing material removed or damaged during the 72 hour period.

After removing the forms, cure the surfaces exposed by placing a berm of moist earth against them or by any of the methods described below, for the remainder of the 72 hour curing period.

520-8.2 Wet Burlap Method: Place burlap, as specified in 925-1, over the entire exposed surface of the concrete, with sufficient extension beyond each side to ensure complete coverage. Overlap adjacent strips a minimum of 6 inches. Hold the burlap securely in place such that it will be in continuous contact with the concrete at all times, and do not allow any earth between the burlap surfaces at laps or between the burlap and the concrete. Saturate the burlap with water before placing it, and keep it thoroughly wet throughout the curing period.

520-8.3 Membrane Curing Compound Method: Apply clear membrane curing compound or white pigmented curing compound, as specified in 925-2, by a hand sprayer meeting the requirements of 350-3.10, in a single coat continuous film at a uniform coverage of at least one gallon per 200 square feet. Immediately recoat any cracks, checks, or other defects appearing in the coating. Thoroughly agitate the curing compound in the drum prior to application, and during application as necessary to prevent settlement of the pigment.

520-8.4 Polyethylene Sheeting Method: Place polyethylene sheeting, as specified in 925-3, over the entire exposed surface of the concrete, with sufficient extension beyond each side to ensure complete coverage. Overlap adjacent strips a minimum of 6 inches. Hold the sheeting securely in place and in continuous contact with the concrete at all times.

520-9 Backfilling and Compaction.
After the concrete has set sufficiently, but not later than three days after pouring, refill the spaces in front and back of the curb to the required elevation with suitable material. Place and thoroughly compact the material in layers not thicker than 6 inches.

520-10 Surface Requirements.
Test the gutter section of curb and gutter with a 10 foot straightedge laid parallel to the centerline of the roadway and while the concrete is still plastic. Perform straightedging along the edge of the gutter adjacent to the pavement or along other lines on the gutter cross-section, as directed by the Engineer. Immediately correct irregularities in excess of 1/4 inch.

520-11 Method of Measurement.
For curb or curb and gutter, the quantity to be paid will be the plan quantity, in feet, measured along the face of the completed and accepted curb or curb and gutter. Curb for sidewalk curb ramps or driveways will be paid at the Contract unit price for the adjacent curb type.

For valley gutter or shoulder gutter, the quantity to be paid will be the plan quantity, in feet, measured along the gutter line of the completed and accepted valley gutter or shoulder gutter.

For concrete traffic separator of constant width, meeting the requirements of Standard Plans, Index 520-020, the quantity to be paid will be the plan quantity, in feet, measured along the center of its width, completed and accepted, including the length of the nose.

For concrete traffic separator of nonstandard or varying width, the quantity to be paid will be the plan quantity, in square yards, completed and accepted.

520-12 Basis of Payment.

520-12.1 Concrete Gutter, Curb Elements, and Traffic Separator: Price and payment will be full compensation for all work specified in this Section, including reinforcement steel, dowels, asphalt pavement and base under traffic separator, joint materials and asphalt curb pad.

520-12.2 Excavation: Excavation for new installations will be paid for as roadway excavation in accordance with 120-13.2.

520-12.3 Payment Items: Payment will be made under:

Item 520-1	***Concrete Curb & Gutter, Type "RA"***	***--per Linear Foot (LF)***
Item 520-2	***Sidewalk Integral Curb***	***--per Linear Foot (LF)***

END OF SECTION 522

SECTION 522

CONCRETE SIDEWALK AND DRIVEWAYS

522-1 Description.
Construct concrete sidewalks and driveways in accordance with the Plans and the Standard Plans. Sidewalk will include curb ramps, landings, transition slopes, sidewalk curb, and edge beams

522-2 Materials.
Meet the requirements specified in 520-2.

522-3 Forms.
Provide forms as specified in 520-3.

522-4 Foundation.
Shape and compact the foundation materials to a firm, even surface, true to grade and cross-slope. Compact areas that have been excavated more than 6 inches below the bottom of the concrete, to a minimum of 95% of AASHTO T99 density. The area to be compacted includes the area directly under and 1 foot beyond each side of the sidewalk or driveway, when right-of-way allows.

522-5 Joints.
Install expansion and contraction joints in accordance with the Plans and the Standard Plans

522-6 Placing Concrete.
Place the concrete as specified in 520-5.

522-7 Finishing.

522-7.1 Screeding: Strike-off the concrete by means of a wood or metal screed, used perpendicular to the forms, to obtain the required grade and remove surplus water and laitance.

522-7.2 Surface Requirements: Imprint concrete as detailed in the Plans, otherwise provide a broom finish. Ensure that the surface variations are not more than 1/4 inch under a 10 foot straightedge or more than 1/8 inch on a 5 foot transverse section. Finish the outer edges of the concrete with an edging tool having a radius of 1/2 inch.

522-8 Curing.
Cure the concrete as specified in 520-8.

522-9 Opening Sidewalk to Pedestrian Traffic.
Install detectable warnings, when shown in the Plans, in accordance with Section 527 on completed sections of sidewalk before opening to pedestrian traffic.

522-10 Method of Measurement.
The quantity to be paid will be plan quantity, in square yards, completed and accepted.

522-11 Basis of Payment.
Price and payment will be full compensation for all work specified in this Section. Excavation for new installations will be paid for under the items for the grading work on the project.

Payment will be made under:

Item 522-1 PCC Sidewalk ***-per Square Yard (SY)***

Item 522-2 PCC Dumpster Pad ***-per Each (EA)***

END OF SECTION 522

SECTION 700

HIGHWAY SIGNING

700-1 General Requirements.

700-1.1 Description: Furnish and erect roadway signs at the locations, and in accordance with the details, shown in the Plans.

The FDOT designates ground traffic signs as signs erected on the shoulders, slopes, or medians, but not extending over the traveled roadway, and may further classify these signs as single post or multi-column.

The FDOT designates signs erected partially or completely over the traveled roadway or mounted on bridges as overhead traffic signs, and may further classify these signs as overhead cantilever or span traffic signs.

Meet the requirements of Section 603.

700-1.2 Materials:

700-1.2.1 General: Meet the materials requirements shown in the Specifications, Standard Plans, and any additional requirements identified in the Plans.

700-1.2.2 Concrete: Use concrete meeting the requirements of Section 346.

700-1.2.3 Static Sign Assembly Requirements: All sign panels shall be aluminum unless otherwise shown in the Plans. Sheets and plates for sign panels shall meet the requirements of ASTM B209, Aluminum Association Alloy 6061-T6, 5154-H38 or 5052-H38. Sign panels for single column ground mounted signs shall utilize aluminum plate with a minimum thickness of 0.08 inches. All other sign panels shall utilize aluminum plate with a minimum thickness of 0.125 inches. All panels shall have rounded corners.

700-1.2.4 Retroreflective Sign Sheeting: Use signs that meet the material and process requirements of Section 994.

Use Type XI sheeting for all regulatory, warning and overhead signs unless otherwise specified. The R1-1, R1-2, R5-1 and R5-1a signs must use a sheeting system that includes a colorless film overlay.

Type XI sheeting shall also be used for all limited access advance exit and exit guide signs.

Use Type IV yellow-green fluorescent sheeting for the following signs:

1. pedestrian: R1-6, R1-6a, R1-6b, R1-6c, R1-9, R1-9a, R10-15, W11-2,

2. shared use path (trail): W11-15, W11-15a,

3. supplemental panels used with signs in (1) through (4), above.

Do not mix signs having fluorescent yellow-green sheeting with signs having yellow retroreflective sheeting.

Roll-up signs shall meet the requirements of Type VI sheeting.

Use Type IV sheeting for all other signs. Use Type IV or Type XI sheeting for retroreflective strips on signs.

700-1.3 Storage, Handling and Labeling: If signs are stored prior to installation, store them in accordance with the manufacturer's recommendations. Properly package signs to protect them during storage, shipment and handling to prevent damage to the sign face and panel. In addition to the information required in Section 994, all permanent roadway signs must be labeled on the back bottom edge with the date of installation. Make the labels unobtrusive, but legible enough to be easily read by an observer on the ground when the sign is in its final position. Apply the label in a manner that is at least as durable as the sign face.

700-1.4 Acceptance of Signs:

700-1.4.1 Sign Inspection: Submit certification that the sign assembly meets the material and installation requirements of the Contract Documents. The Engineer will inspect the signs upon delivery to the storage or project site and again at the final construction inspection. Repair and replace signs deemed unacceptable by the Engineer at no expense to the Owner.

700-1.4.2 Imperfections and Repairs: Repair or replace signs containing imperfections or damage regardless of the kind, type, or cause of the imperfections or damage. For sign panels exceeding 30 square feet, the Contractor may make one patch, if necessary, to each sign panel not to exceed two square inches. Make repairs according to the manufacturer's recommendations and to the satisfaction of the Engineer. Ensure that completed repairs provide a level of quality necessary to maintain the service life of the sign and are satisfactory in appearance to the Engineer.

700-2 Static Signs.

700-2.1 Ground Mounted Signs: Ground mounted signs consist of both single column and multi-column static signs.

700-2.1.1 Materials: Use aluminum tubing materials meeting the general provisions of Section 965 for all single column ground signs. Multi-column signs must be galvanized steel W or S beams steel columns meeting the general provisions of Section 962. All materials must meet the requirements of the appropriate Standard Plans.

700-2.1.2 Fabrication of Panel Messages: Fabricate standard sign panel messages in accordance with details included in the Standard Highway Signs (SHS) manual published by the U.S. Department of Transportation. Submit shop drawings to the Owner for approval as specified in Section 5.

700-2.1.3 Foundation: Construct foundations in accordance with the applicable Standard Plans. The Contractor may use precast foundations in augured or excavated holes a minimum of 12 inches larger than each axis dimension of the precast foundation. Obtain precast foundations from a plant. The holes must be clean and without loose material. Temporary casing will be required if the soil is unstable. Fill the void around the precast foundation with flowable fill meeting the requirements of Section 121 or use clean sand placed using hydraulic methods.

700-2.1.4 Breakaway Support Mechanisms for Ground Traffic Signs:

700-2.1.4.1 Frangible Supports: Provide support posts for all frangible sign assemblies consisting of aluminum tubes up to 3 -1/2 inches outside diameter with 3/16 inch wall thickness in accordance with the requirements in the Standard Plans.

700-2.1.4.2 Slip Bases: Slip base assemblies for single column signs will use aluminum sleeves and base plates. Slip base assemblies for multi-column signs will use galvanized steel bases. All slip bases must be fabricated in accordance with the requirements of the Standard Plans.

700-2.1.5 Installation: Verify the length of the column supports in the field prior to fabrication to permit the appropriate sign mounting height. Fabricate the supports and wind beams in accordance with the Standard Plans. Columns must be plumb and panels must be level with the proper orientation.

700-2.2 Method of Measurement: For single post and multi post sign assemblies, an assembly consists of all the signs mounted on a single structure. The Contract unit price per assembly for ground mounted signs (single post and multi-post), furnished and installed, will include furnishing the sign panels, support structure, foundation, hardware, and labor necessary for a complete and accepted installation.

Relocation of signs will consist of removing the existing sign assembly and installing the sign on a new foundation at the location shown in the Plans.

When the Plans call for existing ground-mounted signs to be relocated or removed, after removing the sign panel from the assembly, remove supports and footings. Restore the area of the sign removal or relocation to the condition of the adjacent area.

700-2.3 Basis of Payment: Price and payment will be full compensation for all work specified in this Section.

Payment will be made under:

Item No. 700-1 Vehicular Signage - per Lump Sum (LS)

END OF SECTION 700

SECTION 710

PAINTED PAVEMENT MARKINGS

710-1 Description.
Apply painted pavement markings, in accordance with the Contract Documents.

710-2 Materials.
Use only materials listed on the FDOT's Approved Product List (APL) meeting the following requirements:

Materials for Raised Pavement Markers (RPMs) and Bituminous Adhesive	Section 970
Standard Paint	971-1 and 971-3
Durable Paint	971-1 and 971-4
Glass Spheres	971-1 and 971-2

The Engineer will take random samples of all material in accordance with the FDOT's Sampling, Testing and Reporting Guide schedule.

710-3 Equipment.
Use equipment that will produce continuous uniform dimensions of pavement markings of varying widths and meet the following requirements:

1. Capable of traveling at a uniform, predetermined rate of speed, both uphill and downhill, in order to produce a uniform application of paint and capable of following straight lines and making normal curves in a true arc.

2. Capable of applying glass spheres to the surface of the completed line by an automatic sphere dispenser attached to the pavement marking machine such that the glass spheres are dispensed closely behind the installed line. Use a glass spheres dispenser equipped with an automatic cut-off control that is synchronized with the cut-off of the paint and applies the glass spheres in a manner such that the spheres appear uniform on the entire pavement markings surface.

3. Capable of spraying the paint to the required thickness and width without thinning of the paint. Equip the paint tank with nozzles equipped with cut-off valves, which will apply broken or skip lines automatically.

710-4 Application.

710-4.1 General: Remove existing pavement markings, such that scars or traces of removed markings will not conflict with new pavement markings, by a method approved by the Engineer.

Before applying pavement markings, remove any material that would adversely affect the bond of the pavement markings by a method approved by the Engineer.

Apply standard paint to dry surfaces only, and when the ambient air and surface temperature is at least 40ºF and rising.

Apply durable paint to dry surfaces only. Do not apply durable paint when the ambient air and surface temperature is below 50°F, relative humidity is above 80% or when the dew point is within 5°F of the ambient air temperature.

Do not apply painted pavement markings when winds are sufficient to cause spray dust.

Apply painted pavement markings, having well defined edges, over existing pavement markings such that not more than 2 inches on either end and not more than 1 inch on either side is visible. When stencils are used to apply symbols and messages, the areas covered by the stencil reinforcing will not be required to be painted.

Mix the paint thoroughly prior to pouring into the painting machine. Apply paint to the pavement by spray or other means approved by the Engineer.

Conduct field testing in accordance with FM 5-541. Remove and replace painted pavement markings not meeting the requirements of this Section at no additional cost to the Owner. Apply all pavement markings prior to opening the road to traffic.

710-4.1.1 Painted Pavement Markings (Final Surface): On concrete surfaces or newly constructed asphalt, the painted pavement markings (final surface) will include one application of standard paint and one application of Class B RPMs applied to the final surface.

For center line and edge line rumble strip installations where the pavement marking is placed within the grinding, apply a second application of standard paint within 24 hours of each day's grinding operation.

For center line rumble strip installations where RPMs are in conflict with the grinding, install Class D RPMs with the first application of standard paint. Remove Class D RPMs prior to grinding, then install Class B RPMs in an unground area after grinding.

Do not apply final surface paint for bicycle arrows or bicycle messages, 24 inch longitudinal bars in special emphasis crosswalks, or route shields where preformed thermoplastic will be applied.

Install all RPMs in accordance with Standard Plans, Indexes 706-001 and 711-003, prior to opening the road to traffic.

Temporary RPMs must meet the requirements of Section 102.

Permanent RPMs must meet the requirements of Section 706.

710-4.2 Thickness: Apply standard paint to attain a minimum wet film thickness in accordance with the manufacturer's recommendations. Apply durable paint to attain a minimum wet film thickness of 0.025 inches or 25 mils. Measure, record, and certify on a FDOT approved form and submit to the Engineer, the thickness of white and yellow durable paint pavement markings in accordance with FM 5-541.

710-4.3 Retroreflectivity: Apply white and yellow standard paint that will attain an initial retroreflectance of not less than 300 mcd/lx·m^2 and not less than 250 mcd/lx·m^2, respectively. Apply white and yellow durable paint that will attain an initial retroreflectance of not less than 450 mcd/lx·m^2 and not less than 300 mcd/lx·m^2, respectively.

Measure, record and certify on a FDOT approved form and submit to the Engineer, the retroreflectivity of white and yellow pavement markings in accordance with FM 5-541.

The Owner reserves the right to test the markings within three days of receipt of the Contractor's certification. Failure to afford the Owner opportunity to test the markings will result in non-payment. The test readings should be representative of the Contractor's pavement marking performance. If the retroreflectivity values measure below values shown above, reapply the pavement marking at no additional cost to the Owner.

For standard paint, ensure that the minimum retroreflectance of white and yellow pavement markings are not less than 150 mcd/lx m2. If the retroreflectivity values for standard paint fall below the 150 mcd/lx m2 value within 180 days of initial application, the pavement marking will be reapplied at the Contractor's expense. If the retroreflectivity values for durable paint fall below the initial values of 450 mcd/lx m2 value for white and 300 mcd/lx m2 for yellow within 180 days of initial application, the pavement marking will be reapplied at the Contractor's expense.

710-4.4 Color: Use paint material that meets the requirements of 971-1.

710-4.5 Glass Spheres: Apply glass spheres on all pavement markings immediately and uniformly following the paint application. The rate of application shall be based on the manufacturer's recommendation.

For longitudinal durable paint markings, apply a double drop of Type 1 and Type 3 glass spheres. For transverse durable paint markings, apply a single drop of Type 3 glass spheres.

The rate of application shall be based on the manufacturer's recommendation.

710-5 Tolerances in Dimensions and in Alignment.
Establish tack points at appropriate intervals for use in aligning pavement markings, and set a stringline from such points to achieve accuracy.

710-5.1 Dimensions:

710-5.1.1 Longitudinal Lines: Apply painted skip line segments with no more than plus or minus 12 inches variance, so that over-tolerance and under-tolerance lengths between skip line and the gap will approximately balance. Apply longitudinal lines at least 2 inches from construction joints of portland cement concrete pavement.

710-5.1.2 Transverse Markings, Gore Markings, Arrows, and Messages: Apply paint in multiple passes when the marking cannot be completed in one pass, with an overall line width allowable tolerance of plus or minus 1 inch.

710-5.1.3 Contrast Lines: Use black paint to provide contrast on concrete or light asphalt pavement, when specified by the Engineer. Apply black paint in 10 foot segments following each longitudinal skip line.

710-5.2 Alignment: Apply painted pavement markings that will not deviate more than 1 inch from the stringline on tangents and curves one degree or less. Apply painted pavement markings that will not deviate more than 2 inches from the stringline on curves greater than one degree. Apply painted edge markings uniformly, not less than 2 inches or more than 4 inches from the edge of pavement, without noticeable breaks or deviations in alignment or width.

Remove and replace at no additional cost to the Owner, pavement markings that deviate more than the above stated requirements.

710-5.3 Correction Rates: Make corrections of variations in width at a maximum rate of 10 feet for each 0.5 inch of correction. Make corrections of variations in alignment at a maximum rate of 25 feet for each 1 inch of correction, to return to the stringline.

710-6 Contractor's Responsibility for Notification.
Notify the Engineer prior to the placement of the materials. At the time of notification, submit a certification to the Engineer with the APL number and the batch or Lot numbers of the paint and glass spheres to be used.

710-7 Protection of Newly Applied Pavement Markings.
Do not allow traffic onto or permit vehicles to cross newly applied pavement markings until they are sufficiently dry. Remove and replace any portion of the pavement markings damaged by passing traffic or from any other cause, at no additional cost to the Owner.

710-8 Corrections for Deficiencies to Applied Painted Pavement Markings.
Reapply a 1.0 mile section, centered around any deficiency, at no additional cost to the Owner.

710-9 Submittals.

710-9.1 Submittal Instructions: Prepare a certification of quantities, using the FDOT's current approved form, for each project in the Contract. Submit the certification of quantities and daily worksheets to the Engineer. For Lump Sum pay item 710-90, document the quantity as an estimated percentage (in decimal form) of the total lump sum amount on the daily worksheet. The Owner will not pay for any disputed items until the Engineer approves the certification of quantities.

710-9.2 Contractor's Certification of Quantities: Request payment by submitting a certification of quantities no later than Twelve O'clock noon Monday after the estimate cut-off date or as directed by the Engineer, based on the amount of work done or completed. Ensure the certification of quantities consists of the following:

1. Contract Number, FPID Number, Certification Number, Certification Date and the period that the certification represents.

2. The basis for arriving at the amount of the progress certification, less payments previously made and less any amount previously retained or withheld. The basis will include a detailed breakdown provided on the certification of items of payment.

710-10 Method of Measurement.
The quantities, authorized and acceptably applied, under this Section will be paid as follows:

1. The length, in gross miles, of solid, 10'-30' skip, 3'-9' dotted, 6'-10' dotted, 2'2' dotted, and 2'-4' dotted lines.

2. The length, in linear feet, of transverse lines, diagonal lines, chevrons, and parking spaces.

3. The number of pavement messages, symbols, and arrows. Each arrow is paid as a complete marking, regardless of the number of "points" or directions.

4. Lump Sum, as specified in 710-4.1.1 (final surface) and 710-9.1.

5. The area, in square feet, for removal of existing markings acceptably removed. Payment for removal of conflicting markings will be in accordance with 102-5.8. Payment for removal of non-conflicting markings will be paid separately. The gross mile measurement will be taken as the distance from the beginning of the painted line to the end of the painted line and will include the unmarked gaps for skip and dotted lines. The gross mile measurement will not include designated unmarked lengths at intersections, turn lanes, etc. Final measurement will be determined by plan dimensions or stations, subject to 9-1.3.1.

710-11 Basis of Payment.

710-11.1 General: Price and payment will be full compensation for all work specified in this Section, including, all cleaning and preparing of surfaces, furnishing of all materials, application, curing and protection of all items, protection of traffic, furnishing of all tools, machines and equipment, and all incidentals necessary to complete the work. Final payment will be withheld until all deficiencies are corrected.

710-11.2 Painted Pavement Markings (Final Surface): Price and payment for painted pavement markings (final surface) will be full compensation for all applications of painted pavement markings, and all applications and removal of RPMs in accordance with 710-4.1.1 and 710-9.1.

710-11.3 Payment Items:

Payment will be made under:

Item 710-1 Landside Pavement Markings --per Lump Sum (LS)

END OF SECTION 710

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture.

C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

A. Material certificates.

B. Material test reports.

C. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.

D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1.5 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.6 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1.

1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301 (ACI 301M).
2. ACI 117 (ACI 117M).

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

C. Galvanized-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from galvanized-steel wire into flat sheets.

D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.4 CONCRETE MATERIALS

A. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I
2. Fly Ash: ASTM C 618, Class F or C
3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
4. Blended Hydraulic Cement: ASTM C 595/C 595M, cement.

B. Normal-Weight Aggregates: ASTM C 33/C 33M, graded.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm).
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Air-Entraining Admixture: ASTM C 260/C 260M.

D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

E. Water: ASTM C 94/C 94M and potable.

2.5 VAPOR RETARDERS

A. Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, with thickness as indicated by the Architect.

2.6 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

2.7 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1752, cork or self-expanding cork.

2.8 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).

B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

2.9 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Normal-Weight Concrete:

1. Minimum Compressive Strength: As indicated on the drawings.
2. Maximum W/C Ratio: 0.45
3. Slump Limit: 3 inches, plus or minus 1 inch (25 mm).
4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

B. Dye-Stained Colored Polished Concrete:

1. Use the Normal-Weight concrete mixtures with the following adjustments:
   a. Maximum Course Aggregate Size: 3/8 inch
   b. Find Aggregate: Natural Sands
   c. Air Entraining: Do not add air entraining admixture
   d. Admixtures: Do not use supplemental admixtures not approved by dye manufacturer.
   e. Water: do not add water to the mix in the field

2.10 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M).

C. Chamfer exterior corners and edges of permanently exposed concrete.

3.2 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR-RETARDER INSTALLATION

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).

3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and

patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

3.9 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305.1 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or

adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

    a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

4. Slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.10 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.11 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION 033000

SECTION 03360 – MECHANICALLY GROUND AND POLISHED CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to Work of this Section.

B. Section Includes:
   1. Curing of interior polished concrete slabs.
   2. Finishing of polished concrete slabs.
   3. Densified & Mechanically Polished concrete.
   4. Broad cast aggregates

C. Related Sections:
   1. Division 3 Section “Cast-In-Place Concrete” for general applications of concrete and coordination of sample submittal.
   2. Division 3 Section “Dye Stain Polished Concrete”
   3. Division 7 Section “Caulking and Sealants” for colored sealant for joints.

1.2 REFERENCES

A. American Concrete Institute (ACI):
   1. ACI 301 “Specification for Structural Concrete for Buildings.”
   2. ACI 302 IR “Recommended Practice for Concrete Floor and Slab Construction.”
   3. ACI 303.1 “Standard Specification for Cast-In-Place Architectural Concrete.”
   4. ACI 304 “Recommended Practice for Measuring, Mixing, Transporting and Placing of Concrete.”
   5. ACI 305R “Recommended Practice for Hot Weather Concreting.”
   6. ACI 306R “Recommended Practice for Cold Weather Concreting.”

B. American Society for Testing and Materials (ASTM):
   1. ASTM C309 “Liquid Membrane-Forming Compounds for Curing Concrete.”
   2. ASTM C494 “Standard Specification for Chemical Admixtures for Concrete.”
   3. ASTM C979 “Standard Specification for Pigments for Integrally Colored
      i. Concrete.”
   4. ASTM E430 “Standard Specification for Evaluating Polished Concrete Glow”

C. American Association of State Highway and Transportation Officials (AASHTO):
   1. AASHTO M194 “Chemical Admixtures.”

D. Concrete Polishing Association of America (CCPA) – Standards and Guidelines

E. National Floor Safety Institute (NFSI) – Floor Friction Standards

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's complete technical data sheets for the following:
   1. Liquid Lithium Silicate Densifier
   2. Wet Curing Blanket.
   3. Protective Blanket for finished concrete floors
   4. Sealant
   5. Sealer

B. Design Mixes: For each type of polished concrete.

C. Qualification Data: For firms indicated in "Quality Assurance" Article, including list of completed projects.

D. Submit the following in accordance with Division 1 Section 01330 "Submittal Procedures."

E. Product data for each grinding machine, including all types of grinding heads, dust extraction system, joint filler, concrete densifying impregnator, penetrating sealer, and any other chemicals used in the process.

F. Applicators qualification data.
   1. Southland Concrete Creations (941-721-4900) is pre-approved for this project.
   2. Applicators must have a minimum of (5) five years experience in this field. Applicator must show names and addresses of (3) three similar jobs.
   3. Applicators must show experience in pouring concrete, broadcasting aggregate, and polishing exposed broadcast aggregate concrete floors.
   4. Include written certification from LM Scofield showing they are qualified to perform this work.

G. Polished concrete samples: Size 24"x 24" , for each Polished Concrete finish required. Field test area of placed concrete – 10'-0" x 10'-10".

I. Product Data: Provide data on all products, including information on compatibility of different products and limitations

J. Field Quality Control – Static Coefficient of Friction Test Reports: Reports of testing specified in PART 3 "Field Quality Control" Article.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer with experience in the production of specified products.

B. Installer Qualifications: An installer with 5 years experience with work of similar scope and quality, and approved in writing by the manufacturer.

C. Comply with the requirements of ACI 301.

D. Obtain each specified material from same source and maintain high degree of consistency in workmanship throughout Project.

E. Notification of manufacturer's authorized representative shall be given at least 1-week before start of Work.

F. Pre-installation Conference: Conduct conference at project site to comply with requirements in Division 1, Section 01310 “Project Management and Coordination.”

G. Provide project names, addresses, contact names, phone numbers of at least three (3) projects of similar scope completed by the installer.

H. Installer/Applicator shall be certified by concrete finish equipment and chemical manufacturer and shall provide adequate number of skilled workmen who are thoroughly trained and experienced in the necessary craft.

I. Manufacturer’s Certification: Provide a letter of acknowledgement from both the equipment and chemical manufacturer stating that the installer is a trained applicator and is familiar with proper procedures and installation requirements recommended by the manufacturer.

J. Ground and Polished Concrete Mockups:
   1. Provide under provisions of Division 1 Section “Quality Control.”
   2. At location on Project selected by Architect, place and finish 10 ft. by 20 ft.area.
   3. Construct mockup using processes and techniques intended for use on permanent work, including curing procedures. Include samples of control, construction, and expansion joints in sample panels. Mockup shall be produced by the individual workers who will perform the work for the Project.
   4. Retain samples of cements, sands, aggregates and used in mockup for comparison with materials used in remaining work.
   5. Aggregate selected must be tested to ensure it will accept polish.
   6. Refer to subparagraph 3.5 of this Section for Scheduled polished concrete cut and shine level and finish coat.
   7. Edges should be included in mockup.
   8. Accepted mockup provides visual standard for work of Section.
   9. Mockup shall remain through completion of work for use as a quality standard for finished work. Protect mock-ups from elements with weather resistant covering and maintain approved field mock ups during construction in an undisturbed condition as a standard for judging completed work.
   10. Remove mockup when directed.
   11. Provide test area that shall be concealed from public view for confirmation of grinding operations.

K. Environmental Limitations:
   1. Comply with manufacturer’s written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation and other conditions affecting chemical performance.

2. Application of finish system shall take place a minimum of 21 days prior to fixture and trim installation and/or substantial completion.
3. Finish concrete area shall be closed to traffic during finish floor application and after application for the time as recommended by the manufacturer.

L. Walkway Auditor: Certified by NFSI to test polished floors for static coefficient of friction according to NFSI 101-A.

M. Static Coefficient of Friction: Achieve not less than 0.5 for level floor surfaces as determined by quality control testing according to NFSI 101-A.

1.5 DELIVERY, STORAGE AND HANDLING

A. Comply with manufacturer's instructions. Deliver liquid densifier in original, unopened packaging. Store in dry conditions.

1.6 PROJECT CONDITIONS

A. Polished Concrete Environmental Requirements:
1. Schedule placement to minimize exposure to wind and hot sun before curing materials are applied.
2. Avoid placing concrete if rain, snow, or frost is forecast within 24-hours. Protect fresh concrete from moisture and freezing.
3. Comply with professional practices described in ACI 305R and ACI 306R.

B. Schedule delivery of concrete to provide consistent mix times from batching until discharge. Mix times shall meet manufacturer’s written recommendations.

1.7 PRE-JOB CONFERENCE

A. Two weeks prior to placement of concrete a pre-installation meeting will be held to discuss the Project and application of materials.

B. The Architect, General Contractor, Subcontractor, Testing Agency, Ready-Mix Concrete Representative, and a Manufacturer's Representative shall be present.

C. Proposed Agenda:
1. Environmental requirements.
2. Scheduling and phasing of work.
3. Coordinating with other work and personnel.
4. Protection of adjacent surfaces.
5. Surface preparation.
6. Repair of defects and defective work prior to installation.
7. Cleaning.
8. Application of liquid hardener, densifier.
9. Importance of un-reacted silicate rinse.
10. Installation of polished non-film forming floor finishes

11. Protection of finished surfaces after installation.
12. Sustainable design issues
13. Storage and Disposal of unused materials

D. Reports: Record discussions, including decisions and agreements reached, and furnish copy of record to each party attending.

E. Damage and Stain Prevention: Take precautions to prevent damage and staining of concrete surfaces to be polished.
1. Prohibit vehicle parking over concrete surfaces to be polished.
2. Prohibit pipe cutting operations over concrete surfaces to be polished.
3. Prohibit storage of any items over concrete surfaces to be polished for not less than 28 days after concrete placement.
4. Prohibit ferrous metals storage over concrete surfaces to be polished.
5. Protect from petroleum, oil, hydraulic fluid, or other liquid dripping from equipment working over concrete surfaces to be polished.
6. Protect from acids and acidic detergents contacting concrete surfaces to be polished.
7. Protect from painting activities over concrete surfaces to be polished.

F. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting liquid applied product application.

1.8 WARRANTY

A. Provide year manufacturer's standard (10) ten year material warranty commencing at date of building substantial completion. Manufacturer shall warrant to the owner that polished surface will remain water repellent, dustproof, hardened and abrasion resistant.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

A. Basis of Design: L.M. SCOFIELD COMPANY, Douglasville, Georgia (800) 800-9900 or the appropriate local contact: Eastern Division – 201-672-9050; Florida Representative, Steve Rissi – 727-515-1849

B. Other acceptable and qualified manufactures approved by the Architect and that meet or exceed the specified requirements. Substitutions shall be submitted in accordance with Division 1, Section 01600 - Materials and Equipment.

2.2 MATERIALS & EQUIPMENT

A. Liquid Densifier: Odorless, non-hazardous, silicate that penetrates concrete to react with free lime and calcium hydroxide to produce permanent chemical reaction that hardens and densifies concrete surface.

B. Dyes: Extremely fine molecules of color solvent or dye for mixing with water or acetone that is designed to penetrate and color concrete surface. Refer to specification Section 03361 “Dye Stained Colored Polished Concrete” for additional requirements.

C. Pigmented Microstains: Extremely fine pigment particles in a water-based silicate solution that penetrates concrete and reacts with calcium hydroxide to lock in color particles.

D. Polish Guard: Non-film forming, stain resistant, food resistant, chemical stain resistant, impregnating sealant designed to be used on concrete surfaces previously densified

E. Curing Compound for Dye Stained Concrete:
   a. MC Tech UltraCure NCF (866)-913-8363

F. Chemical Hardener/Densifiers Manufactured by L.M. SCOFIELD COMPANY:
   a. SCOFIELD® Formula One™-MP is a high performing hardening and dust proofing compound that is chemically reactive and permanently bonds to concrete formulated to be used in conjunction with integrally colored concrete as well as uncolored concrete. (No substitutions – unless approved in writing by the Architect)
   b. SCOFIELD® Guard-W

G. 3-head or 4-head counter rotating variable speed floor grinding machine with at least 600 pounds down pressure.

H. Dust extraction system, pre-separator, and squeegee attachments with minimum flow rating of 322 cubic feet per minute.

I. Protective Blanket for Finished Floor: Dura Cover by Pro Guard 888-977-6482

J. Substitutions: The use of products other than those specified will be considered providing that the Contractor requests its use in writing aspect Section 1600 Materials and Equipment prior to bid date. This request shall be accompanied by the following:
   1. A certificate of compliance from material manufacturer stating that proposed products meet or exceed requirements of this Section, including standards ACI 303.1, ASTM C979, ASTM C494 and AASHTO M194.
   2. Documented proof that proposed materials have a 10-year proven record of performance, confirmed by at least 5 local projects that Architect can examine.

2.3 ACCESSORIES

A. Patching Compound: Compound composed of 40 percent portland cement, 45 percent limestone, and 15 percent vinyl acetate copolymer, when mixed with dust salvaged from grinding process forms a paste that hardens when surface imperfections are filled.

B. Grout Material: REQUIRED Clear modified silicate sealant, containing no pore clogging latex, when mixed with dust salvaged from grinding process forms a paste that reacts with calcium hydroxide in concrete that hardens when surface imperfections are filled.

C. Protective Cover: Non-woven, puncture and tear resistant, polypropylene fibers laminated with a multi-ply, textured membrane, not less than 18 mils in thickness.

2.4 POLISHING EQUIPMENT

A. Field Grinding and Polishing Equipment:
   1. Variable speed, multiple head, counter-rotating, walk-behind machine with not less than 600 pounds of down pressure on grinding or diamond polishing pads.
   2. If dry grinding, honing, or polishing, use dust extraction equipment with flow rate suitable for dust generated, with squeegee attachments.

B. Edge Grinding and Polishing Equipment: Hand-held or walk-behind machines which produces same results, without noticeable differences, as field grinding and polishing equipment.

C. Burnishing Equipment: High speed walk-behind or ride-on machines capable of generating 2400 revolutions per minute and with sufficient head pressure of not less than 20 pounds to raise floor temperature by 20 degrees F.

D. Metal Bonded Pads: Grinding pads with embedded industrial grade diamonds of varying grits fabricated for mounting on equipment.

E. Resin Bonded Pads: Polishing pads with embedded industrial grade diamonds of varying grits fabricated for mounting on equipment.

F. Burnishing Pads: Maintenance pads for use with high speed burnishing equipment.

2.5 CONCRETE MIX DESIGN

A. Refer to concrete specifications.

B. Do not add calcium chloride to mix as it causes mottling and surface discoloration.

C. Supplemental admixtures shall not be used unless approved by manufacturer. Mix design is to include high range water reducer and ¾# of Propex 150 fiber (stealth) or Architect/Engineer approved equal.

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2.6 BROAD CAST AGGREGATES

1. Blue Glass: match Architect's sample #3 sized aggregate with broadcast spread at rate of 0.50lbs/SF

2. Black Aggregate/Glass: #2 sized black aggregate or black glass with broadcast rate of 0.20lbs/SF.

3. Black Beauty Aggregate integral to the concrete mix, rate of 10% of the cement mix design, or less based on the architect approved sample.

PART 3 - EXECUTION

3.1 CONCRETE INSTALLATION

A. Install concrete according to requirements of Division 3 Section “Cast-In-Place Concrete.”

B. Do not add water to concrete mix in the field.

C. Surfaces shall be finished uniformly with the following finish:
1. Broad Cast Aggregate: TO BE PERFORMED BY POLISHING CONTRACTOR WORKING ALONG SIDE CONCRETE FINISHING CONTRACTOR. Field broadcast aggregate to top layer of concrete to achieve variegated colored finish and aggregate color aggregate should be applied at a consistent rate to provide a relative uniform appearance of the aggregate application to match mock up sample.
2. Trowel: Precautions should be taken to ensure that the surface is uniformly troweled so that it will not be slippery. Do not over-trowel or burnish the surface.
3. Finish concrete shall have a minimum Floor Flatness rating of at least 50.
4. Finish concrete shall be cured a minimum of 7 days or at which point equipment can be put on the slab and provided the initial grinding does not displace aggregate. Initial grind may be performed as soon as grinders will cut the concrete without tearing surface of concrete pending test area results. A grinding test area shall be established that is not visible to public or that will be concealed to confirm acceptability of proceeding with grinding operations. Final polish may not be performed until concrete is cured a minimum of 28 days old
5. Ground and Polished Concrete Surface: Precautions should be taken to insure the surface is within in tolerance to perform this function.

3.2 CURING

A. Concrete: Apply wet curing blanket for concrete according to manufacturer's instructions using manufacturer’s recommended application techniques. Cured Concrete floor shall be wet cleaned with an Auto Scrubber as the wet blankets are removed to remove any surface laitance.

B. Precautions shall be taken in hot weather to prevent plastic cracking resulting from excessively rapid drying at surface as described in CIP 5 *Plastic Shrinkage Cracking* published by the National Ready Mixed Concrete Association.

3.3 EXAMINATION

A. Acceptance of Surfaces and Conditions:
   1. Examine substrates to be polished for compliance with requirements and other conditions affecting performance.
   2. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents.
   3. Starting work within a particular area will be construed as acceptance of surface conditions.

3.4 PREPARATION

A. Cleaning New Concrete Surfaces:
   1. Prepare and clean concrete surfaces.
   2. Provide sound concrete surfaces free of laitance, glaze, and efflorescence, curing contaminants incompatible with liquid applied products and polishing.

3.5 MECHANICALLY POLISHED CONCRETE CUT AND SHINE LEVELS

A. Cut Level (Depth of cut)

   1. Grade 3 – heavy exposure of course aggregate; remove no more than 1/3” of concrete surface by grinding and polishing resulting in a majority of exposure displaying medium aggregate with small amount of large aggregate at random locations in accordance with Concrete Polishing Association of America standards

B. Shine Level

   1. Class 3 – 1500 grit polish high gloss
   2. Procedure: Not less than 6 steps with full refinement of each diamond pad up to 1500 grit resin bonded pad with one application of densifier.
   3. Gloss Reading: Not less than 60 according to ASTM E 430 before polish guard application.

C. Polished concrete finish coat
   1. At a distance of 100 feet, the floor will reflect images from side lighting. Sheen shall be as measured by Horiba IG-620 Gloss checker – 60 degree film gloss valve = 80 minimum or ASTM E430.
   2. Apply two applications of SCOFIELD® Finish Coat. Guard W

D. Specified for project
   Grade: 3 heavy exposure of course aggregate
   Class: 3 grit polish high gloss
   Guard-W Finish Coat applications: (2) two coats minimum.

3.6 MECHANICALLY POLISHED CONCRETE APPLICATION

A. Applicator shall examine the areas and conditions under which work of this section will be provided and the General Contractor shall correct conditions detrimental to the timely and proper completion of the work and the Applicator shall not proceed until unsatisfactory conditions are resolved.

B. Installer and manufacturer's representative will examine surfaces receiving concrete finish and polishing system.
   a. Verify that surfaces conform to product manufacturer's requirements for substrate conditions.
   b. Verify floor is free of curing membrane, bond-breaker, concrete laitance, and will absorb water per water absorbency test.

C. Sequence of Polishing: Perform initial grind before interior walls are framed and constructed. Perform final grinding and polishing after partition studs are erected, but before gypsum board is installed.

D. Treating Surface Imperfections:

1. Mix patching compound and grout material with dust created by grinding operations to match color of adjacent concrete surface.
2. Fill surface imperfections including, but not limited to, holes, surface damage, small and micro cracks, air holes, pop-outs, and voids.
3. Work compound and treatment until color differences between concrete surface and filled surface imperfections are not reasonably noticeable when viewed from (10) ten feet away under lighting conditions that will be present after construction.

E. Grout Grinding:

1. Use grinding equipment and appropriate grit grinding pads.
2. While applying fresh grout material prior to, grind concrete in direction perpendicular to initial grinding to remove scratches.
3. Vacuum floor using squeegee vacuum attachment after each pass.

F. Honing:

1. Use grinding equipment with resin bonded grinding pads.
2. Grind concrete in one direction starting with 50 grit pad and make as many sequential passes required to remove scratches, each pass perpendicular to previous pass, up to 400 grit pad reaching maximum refinement with each pass before proceeding to finer grit pads.
3. Auto scrub or vacuum floor using squeegee vacuum attachment after each pass.

G. Grind the concrete floor to within (2) two inches of walls up to 150 grit metal bond diamond pads removing construction debris, floor slab imperfections. The starting grinding pad grit will be determined by condition of concrete slab and Grade finish specified.

1. Use polishing equipment with resin bonded polishing and burnishing pads.
2. Begin polishing in one direction starting with 150 grit pad.
3. Make sequential passes with each pass perpendicular to previous pass using finer grit pad with each pass, up to 1500 grit.
4. Achieve maximum refinement with each pass before proceeding to finer grit pads.
5. Auto scrub or vacuum floor using squeegee vacuum attachment after each pass.

6. Continue polishing until gloss appearance, as measured according to ASTM E 430, matches approved field mock-ups, and reflectance meets or exceeds the provisions outlined in the specifications, or as approved by the Architect.

H. (If specified) Grind the edges up to 150 grit grinding pads removing all the scratches from the previous grit. Vacuum the floor thoroughly after each grind using a squeegee vacuum attachment.

I. Apply densifying impregnator undiluted at approximately 200-400 square feet per gallon using a stiff, long bristled broom. Cover the entire area liberally. Using a broom, work the densifier into the substrate for 30 minutes. During this 30-minute period, continually keep the substrate wet with densifier. Squeegee excess material off the floor. Remove all residue by scrubbing and flushing surface with clean water. Allow 12 to 24 hours for full cure.

J. Polish the floor, to the specified sheen level, with phenolic resin bonded diamond grits, first polishing the edges (if specified) with pads of the same grit and then the field of the floor removing all scratches from the previous grit. After each polish, clean the floor thoroughly using clean water and an auto scrubber or a mop and a wet vacuum.

K. Apply Guard-W Finish coat at 1000 square feet per gallon. Allow to dry 1-2 hours.

L. Using a high speed (2400 rpm) burnishing machine equipped with [1500] grit diamond impregnated pads, buff the surface to a high shine.

M. Apply second application of Guard-W Finish Coat at 1000 sq. per gallon. Allow to dry 1-2 hours.

N. Using a high speed (2400 rpm) burnishing machine equipped with [1500] grit diamond impregnated pads, buff the surface to a high shine.

O. Upon completion, the work shall be ready for final inspection and acceptance by the Architect.

P. Change in gloss to 80 as measured using a gloss meter in accordance with Horiba IG-320 Glass Checker or 60 ASTM E 430 before polish guard application.

3.7 JOINT FILLER

A. Prime and fill with manufacturer's approved polyurea shore 55 or 65 semi rigid joint filler epoxy joint sealant those joints that require the application of joint sealant after the application of the finishing system or as directed by the manufacturer or Architect.

3.8 TOLERANCES

A. Minor variations in appearance of polished colored concrete, which are similar to natural variations in color and appearance of unpolished concrete, are acceptable.

3.9 CLEANING

A. The work area shall be kept clean and free of debris at all times.

B. Remove slurry and dust from adjoining surfaces as necessary.

C. Dispose of material containers in accordance with local regulations and sustainable guide lines.

D. Protect finished work until fully cured per manufacturer’s recommendations.

3.10 PROTECTION

A. Protect concrete floors prior to as well as after the polishing process with ProGuard Dura Cover Protective Blankets (877-977-6482)

3.11 FIELD QUALITY CONTROL

A. Field Testing: Engage a qualified walkway auditor to perform field testing according to NFSI 101-A to determine if polished concrete floor finish complies with specified static coefficient of friction.

B. Confirming gloss level as per specified requirements.

3.12 CLOSEOUT ACTIVITIES

A. Maintenance Training: CPAA Master Craftsman shall train Owner's designated personnel in proper procedures for maintaining polished concrete floor.

END OF SECTION 03360

SECTION 03361 – DYE STAINED COLORED POLISHED CONCRETE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to Work of this Section.

1.2 SUMMARY

A. Section Includes:
1. Dye stained concrete interior floor slabs.
2. Densified & Mechanically Polished Dyed concrete.
3. Wet Curing Blanket
4. Protective Blankets for finished floor.
5. Concrete Final Finish Sealer

B. Related Sections:
1. Section 03300 “Cast-In-Place Concrete” for general applications of concrete and coordination of sample submittal.
2. Division 7 Section “Caulking and Sealants” for colored sealant for joints.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer’s complete technical data sheets for the following:
1. Concrete dye stain.
2. Liquid Lithium Silicate Densifier
3. Stain Guard Finish Coat

B. Samples for Initial Selection: Manufacturer's color charts showing full range of colors available.

C. Qualification Data: For firms indicated in “Quality Assurance” Article, including list of completed projects.

D. Submit the following in accordance with Division 1 Section 01330 “Submittal Procedures.”

E. Product data for each grinding machine, including all types of grinding heads, dust extraction system, joint filler, concrete densifying impregnator, penetrating sealer, and any other chemicals used in the process.

F. Applicators qualification data.

G. Polished concrete samples: Size 7”x9”, for each Polished Concrete finish required.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer with experience in the production of specified products.

B. Installer Qualifications: An installer with 5 years' experience with work of similar scope and quality, approved in writing form by the concrete dye manufacture.

C. Obtain each specified material from same source and maintain high degree of consistency in workmanship throughout Project.

D. Notification of manufacturer's authorized representative shall be given at least 1-week before start of Work.

E. Pre-installation Conference: Conduct conference at project site to comply with requirements in Division 1 Section 01310 "Project Management and Coordination."

F. Provide project names, addresses, contact names, phone numbers of at least three (3) projects of similar scope completed by the installer.

G. Installer/Applicator shall be certified by concrete finish equipment and chemical manufacturer and shall provide adequate number of skilled workmen who are thoroughly trained and experienced in the necessary craft.

H. Manufacturer's Certification: Provide a letter of acknowledgement from both the equipment and chemical manufacturer stating that the installer is a trained applicator and is familiar with proper procedures and installation requirements recommended by the manufacturer.

I. Dye Stained Ground and Polished Concrete Mockups:
   1. Provide under provisions of Division 1 Section "Quality Control."
   2. At location on Project selected by the Owner, place and finish 10 ft. by 10 ft. area.
   3. Construct mockup using processes and techniques intended for use on permanent work, including curing procedures. Include samples of control, construction, and expansion joints in sample panels. Mockup shall be produced by the individual workers who will perform the work for the Project.
   4. Retain samples of cements, sands, aggregates and color additives used in mockup for comparison with materials used in remaining work.
   5. Aggregate selected must be tested to ensure it will accept polish.
   6. Prior to installation of the finish coat, ensure cured panel meets ANSI B101.1 DCOF dynamic coefficient of friction.
   7. Refer to subparagraph 3.4 of this Section for Scheduled stained and polished concrete cut and shine level and finish coat.
   8. Edges should be included in mockup.
   9. Accepted mockup provides visual and performance standard for work of Section.
   10. Mockup shall remain through completion of work for use as a quality standard for finished work.

10. Remove mockup when directed.

J. Environmental Limitations:
   1. Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation and other conditions affecting chemical performance.
   2. Application of finish and dye system shall take place a minimum of 21 days prior to fixture and trim installation and/or substantial completion.
   3. Finish concrete area shall be closed to traffic during finish floor application and after application for the time as recommended by the manufacturer.

1.5 DELIVERY, STORAGE AND HANDLING

A. Comply with manufacturer's instructions. Deliver dye stain and liquid densifier in original, unopened packaging. Store in dry conditions.

1.6 PRE-JOB CONFERENCE

A. Two weeks prior to placement of concrete a pre-installation meeting will be held to discuss the Project and application of materials.

B. The Owner, Owner's designated representative Architect, Contractor, and Trade Subcontractor, Ready-Mix Concrete Representative, and a Manufacturer's Representative shall be present.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Basis of Design: L.M. SCOFIELD COMPANY, Douglasville, Georgia (800) 800-9900 or the appropriate local contact: Eastern Division – 201-672-9050; Florida Representative, Steve Rissi – 727-515-1849
B. Other acceptable and qualified manufactures approved by the Architect and that meet or exceed the specified requirements. Substitutions shall be submitted in accordance with Division 1, Section 01600 - Materials and Equipment.

2.2 MATERIALS

A. Wet Curing Blanket

   1. McTech UltraCure NCF Wet Curing Blanket: 866-913-8363

B. Color Liquid Dye Concentrate, Lithium Silicate Densifier and Finish Coat:

   1. SCOFIELD® Formula One™ Liquid Dye Concentrate by L.M. SCOFIELD COMPANY.

2. SCOFIELD® Formula One-MP™ Lithium Densifier by L.M. SCOFIELD COMPANY.
3. SCOFIELD® Formula One™ Guard-W Finish Coat by L.M. SCOFIELD COMPANY.

C. Concrete Grinding & Polishing Equipment:

2. 3-head or 4-head counter rotating variable speed floor grinding machine with at least 600 pounds down pressure.
3. Dust extraction system, pre-separator, and squeegee attachments with minimum flow rating of 322-cubic feet per minute.
4. Grinding heads:
   a. Metal bonded to be determined by condition of concrete slab.
   b. Resin bonded, phenolic diamonds, to be determined by condition of concrete slab.
5. Grinding pads for edges (as required to achieve uniform appearance):
   a. 50, 100 and 150 grits metal.
   b. 100, 200, 400, 800, 1500 grits resin.
6. Hand grinder with dust extraction equipment and pads.

D. SUBSTITUTIONS: The use of products other than those specified will be considered providing that the Contractor requests its use in writing within 14-days prior to bid date. This request shall be accompanied by the following:
1. A certificate of compliance from material manufacturer stating that proposed products meet or exceed requirements of this Section, including standards ACI 303.1, ASTM C979, ASTM C494 and AASHTO M194.
2. Documented proof that proposed materials have a 10-year proven record of performance, confirmed by at least 5 local projects that the Owner and Architect can examine.

2.3 CONCRETE MIX DESIGN

A. Minimum Cement Content: 5 sacks per cubic yard of concrete.

B. Concrete fines to be natural sand; aggregate 3/8” diameter.

C. No Air Entraining Admixtures shall be used.

D. Slump of concrete shall be consistent throughout Project at 4-inches or less. At no time shall slump exceed 5-inches.

E. Do not add calcium chloride to mix as it causes mottling and surface discoloration.

F. Supplemental admixtures shall not be used unless approved by manufacturer.

G. Do not add water to the mix in the field

2.4 COLORS

A. Concrete Dye Stain(s):
1. Formula One Liquid Dye Concentrate by L.M. SCOFIELD COMPANY: Black - 0510 and Blue where noted on the drawings or to create the compass rosette patterns.

PART 3 – EXECUTION

3.1 VAPOR TESTING CONCRETE FLOORS

A. Alkalinity:
1. Test Method: Measure pH according to method indicated in ASTM F 710.
2. Acceptable Results: pH between 8 and 10.

B. Moisture Vapor Transmission Rate:
1. Test Method: Perform anhydrous calcium chloride test according to ASTM F 1869.
2. Acceptable Results: Not more than 5 pounds per 1000 square feet in 24 hours.

C. Relative Humidity:
1. Test Method: Perform relative humidity test using in situ probes according to ASTM F 2170.
2. Acceptable Results: Not more than 75 percent.

3.2 COLORING CONCRETE FLOORS

A. Dye or Pigmented Microstain Application:
1. Apply solution by methods and techniques required by manufacturer to produce finish matching approved mock-ups.
2. Maintain straight line wet edge, working newly applied solution into edges of adjacent wet edges of previously treated surfaces.
3. Maintain consistent saturation throughout application.
4. Avoid splashing, dripping, or puddling of solution on adjacent substrates.
5. When color matches approved mock-ups, neutralize as required by manufacturer.

3.3 WET CURING BLANKET FOR POLISHED CONCRETE SLAB

A. Concrete slab to have 7-day wet cure using McTech Ultracure NCF Blanket.

3.4 MECHANICALLY POLISHED CONCRETE CUT AND SHINE LEVELS

A. Cut Level (Depth of cut)

1. Grade 3 – heavy exposure of course aggregate

B. Shine Level
1. Class 3 – 1500 grit polish

C. Polished concrete finish coat
   1. At a distance of 100 feet, the floor will reflect images from side lighting.
   2. Apply two applications of SCOFIELD® Finish Coat.

D. Specified for project
   Grade: III-Aggregate Exposure
   Class: III-High reflectivity, 1500 grit
   Formula One Guard-W applications: 2

3.5 MECHANICALLY POLISHED CONCRETE APPLICATION

A. Applicator shall examine the areas and conditions under which work of this section will be provided and the Contractor shall correct conditions detrimental to the timely and proper completion of the work and the Applicator shall not proceed until unsatisfactory conditions are resolved.

B. Grind the concrete floor to within 2 – 3 inches of walls with grit to be determined by specified Cut Level, removing construction debris, floor slab imperfections and until there is a uniform scratch pattern and desired concrete aggregate exposure.

C. Fill construction joints and cracks with filler products as specified in accordance with manufacturer's instructions colored to match (or contrast) with concrete color as specified by the Architect.

D. Grind & Polish the floor, to 400 grit, first polishing the edges (if specified) with pads of the same grit and then the field of the floor removing all scratches from the previous grit. After each polish, clean the floor thoroughly using clean water and an auto scrubber or a mop and a wet vacuum.

E. Apply dye to surface at a rate of 400 – 600 square feet per gallon after 400-resin bond grind. Allow dye to dry to touch. **APPLY DYE ONLY TO AREAS INDICATED ON THE DRAWINGS; PREVENT DYE FROM BLEEDING TO NON-STAINED AREAS.**

F. After the dye has dried, apply densifier at a rate of 300-400 square feet per gallon. Using a broom, work the material into the floor for a minimum of 30 minutes. Tight squeegee the remaining material from the floor without leaving squeegee marks or puddles. Flush floor with clean water and scrub to remove any excess residue. Allow to cure for 12 – 24 hours.

G. Polish to desired gloss level using 1500 resin bond grinds.

H. Apply Formula One Guard-W at 1000 square feet per gallon. Allow to dry.

I. Using a high speed (2400 rpm) burnishing machine equipped with 1500 grit diamond impregnated pads, buff the surface to a high shine.

J. Apply second application of Formula One Guard-W at 1000 square feet per gallon. Allow to dry.

K. Using a high speed (2400 rpm) burnishing machine equipped with 1500 grit diamond impregnated pads, buff the surface to a high shine.

L. Upon completion, the work shall be ready for final inspection and acceptance by the customer.

3.6 PROTECTION

A. Finished work to be protected with ProGuard Dura Cover Protective Blankets (877) - 977-6482.

3.7 CLEANING

A. The work area shall be kept clean and free of debris at all times.

B. Remove slurry and dust from adjoining surfaces as necessary.

C. Dispose of material containers in accordance with local regulations.

D. Protect finished work until fully cured per manufacturer’s recommendations.

END OF SECTION 03361

SECTION 03481 – PRECAST CONCRETE BOLLARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Precast concrete bollards.

B. Related Requirements:

1. 03300 Cast-In-Place Concrete.
2. 05500 Metal Fabrications.

1.3 REFERENCE STANDARDS

A. ASTM C666 – Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.

B. ASTM C825 – Standard Specifications for Precast Concrete Barriers.

C. ASTM C979 – Standard Specification for Pigments for Integrally Colored Concrete.

1.4 SUBMITTALS

A. Comply with Section 01330- Submittal Procedures.

B. Product Data: Provide for each type of bollard specified, including shop drawing showing reinforcing & bollard setting method.

C. Color & Finish Samples: Submit specified colors and finishes for selection and approval by the Architect.

D. Maintenance Data: Submit manufacturer’s field touch-up, cleaning and maintenance instructions

E. Warranty Documentation: Submit sample of manufacturer’s warranty

1.5 QUALITY ASSURANCE

A. Comply with Section 01400 – Quality Requirements and Tasting Laboratory Services.

1.6 DELIVERY, STORAGE AND HANDLING

A. Comply with Section 016600 – Materials and Equipment

B. Protect bollards and accessories during delivery, storage, and handling.

1.7 WARRANTY

A. Comply with Section 01740 – Warranties and Bonds and 01770 Closeout Procedures.

B. Provide manufacturer's standard warranty against defects in materials and workmanship.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design/Manufacturer: Precast Keystone 4610 Enterprise Ave Naples, Florida 34104, phone (239) 435-3575, website https://precastkeystone.com/, email info@precastkeystone.com

B. Substitutions Comply with provisions of Section 01600 Materials and Equipment for substitution procedures. Alternate manufacturers that meet the requirements of the Contract Documents and approval of the Architect will be considered.

2.2 PRECAST CONCRETE BOLLARDS

A. Materials:

1. Concrete: Precast concrete with 5000 psi minimum compressive strength.
   a. Components: ASTM C150, Type I or III cement, Shell Black Beauty & Lite Gray Limestone and Shell aggregate to match the concrete columns exposed aggregate.
   b. Pigments: ASTM C979, natural mineral oxide pigments, temperature-stable and non-fading.
2. Reinforcing: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed or 6x6x10 gauge wire mesh (where needed), with minimum of 1" concrete cover.
3. Steel Pipe: ASTM A 500, Grade B.
4. Cement- Very light gray color or white- 7-7½ bag per cubic yard; color to be selected by Architect.

5. Chemically entrained air (6-8%) for salt and chloride resistant.
6. Cured indoors under plastic cover before exposure to outside air.
7. Finish- Exposed aggregate – Light to medium sand blasted finish
8. Sealer – Manufacturers standard non-gloss-clear-penetrating sealer, minimum of two (2) coats.
9. Lifting ring – Integral lifting ring

B. Installation: Sleeve over galvanized metal pipe bollard.

2.3 ACCESSORIES

A. Installation Materials:

1. Grout: Non-shrink, non-ferrous grout.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine paving of other substrates for compliance with manufacturer's requirements for placement and location of embedded items, condition of substrate, and other conditions affecting installation of bollards.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's installation instructions and setting drawings.

B. Damaged, cracked, chipped, deformed or marred bollards are not acceptable. Field touch-up minor imperfections in accordance with manufacturer's instructions.

C. Precast Concrete Bollards: Install according to manufacturer's instructions:

1. Sleeved for steel substrates: Support bollard during placement and grout cure.

3.3 CLEANING & PROTECTION

A. Protect bollards against damage.

B. Immediately prior to Substantial Completion, clean bollards in accordance with manufacturer's instructions to remove dust, dirt, adhesives, and other foreign materials.

C. Touch up damaged finishes according to manufacturer's instructions.

3.4 CLOSEOUT ACTITIVIES

A. Provide executed warranty.

END OF SECTION 03481

SECTION 04412 – THIN SET STONE VENEER

PART 1 – GENERAL

A. Drawings and general provisions of the Contract, including General Provisions and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.1 SECTION INCLUDES

A. Stone cladding, siding and veneer of interior and exterior walls as indicated on the Drawings.

B. Stone accent trim and shapes.

1.2 RELATED SECTIONS

A. Section 04810 - Unit Masonry Assemblies (Concrete Unit Masonry): Masonry supporting walls.

B. Section 05500 - Metal Fabrications: Galvanized shelf angles, structural supports, anchors and other built-in components for building into natural thin veneer stone.

C. Section 07900 - Caulking and Sealants: Sealant and joint filler for perimeter and control joints.

D. Section 09180 - Cement Plaster Stucco: Metal lath and scratch coat back-up over supporting walls.

1.3 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI A118.4 – Specifications for Latex-Portland Cement Mortar.

B. American Society for Testing and Materials (ASTM):

1. ASTM C 39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
2. ASTM C 67 – Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
3. ASTM C 144 – Standard Specification for Aggregate for Masonry Mortar.
4. ASTM C 177 – Standard Test Method for Steady-State Head Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
5. ASTM C 207 – Standard Specification for Hydrated Lime for Masonry Purposes.
6. ASTM C 270 – Standard Specification for Mortar for Unit Masonry.
7. ASTM C 482 – Standard Test Method for Bond Strength of Ceramic Tile to Portland Cement.

8. ASTM C 567 – Standard Test Method for Determining Density of Structural Lightweight Concrete.
9. ASTM C 847 – Standard Specification for Metal Lath.
10. ASTM C 932 – Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering.
11. ASTM C 979 – Standard Specification for Pigments for Integrally Colored Concrete.
12. ASTM C 1032 – Standard Specification for Woven Wire Plaster Base.
13. ASTM C 1059 – Standard Specification for Latex Agents for Bonding Fresh To Hardened Concrete.
14. ASTM D 226 – Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
15. ASTM C1063 – Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster
16. ASTM C1329 – Standard specification for Portland cement
17. ASTM C578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
18. ASTM C1289 – Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
19. ASTM E2556/E2556M – Standard Specification for Vapor Permeable Flexible Sheet Water-Resistive Barriers Intended for Mechanical Attachment

C. Other Standards:

1. UBC Standard No. 14-1, Kraft Waterproof Building Paper
2. ICC AC38 Acceptance Criteria for Water Resistive Barriers
3. UU-B-790 Building Paper, Vegetable Based, Kraft, waterproofed, water repellent and fireproof

1.4 SUBMITTALS

A. Submit under provisions of Section 01330 Submittal Procedures.

B. Product Data:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.
4. Sealers as per manufacturer’s requirements.

C. Selection Samples: Submit mortar color samples.

D. Verification Samples: Submit 2 manufacturer’s full-size samples of natural veneer stone for each pattern specified, and sealer when applicable

E. Verification Samples: Following initial sample selection submit “laid-up” sample board using the selected stone and mortar materials and showing the full range of colors expected in the finished Work; minimum sample size: 3 by 3 feet (1 by 1 m).

F. Quality Assurance/Control Submittals:

1. Qualifications:

a) Proof of manufacturer qualifications.
b) Proof of installer qualifications.

2. Regulatory Requirements: Evaluation reports.
3. Veneer manufacturer's installation instructions.
4. Installation instructions for other materials.

1.5 QUALITY ASSURANCE

A. Stone Producer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

B. Stone Installer Qualifications: Company specializing in performing Work of this section with minimum five years documented experience.

C. Mock-Up: Provide a mock-up for evaluation of stone, mortar color and application workmanship.

1. Finish areas designated by Architect and Owner.
2. Do not proceed with remaining work until Architect approves workmanship, color, and sheen.
3. Refinish mock-up area as required to produce acceptable work.

D. Expansion Joints: Provide expansions joints in accordance with details and as recommended by manufacturer. Confirm locations and frequency with Architect before beginning work.

E. Pre-install Meeting.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store stone on pallets or wooden crates. Pallet shall be shrink-wrapped.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install natural stone veneer under environmental conditions outside manufacturer's limits.

B. Hot and Cold Weather Requirements: ACI 530.1/ASCE 6/TMS 602.

C. Air Temperature: 40 degrees F or above during installation.

D. Mortar Mixing Water: Heat mortar mixing water when air temperature falls below 50 degrees F.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Eldorado Stone or Architect and Owner approved equal.

B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 VENEER STONE

A. Veneer Unit properties: Precast veneer units consisting of portland cement, lightweight aggregates, and mineral oxide pigments.

1. Compressive Strength: ASTM C 192 and ASTM C 39, 5 sample average: greater than 1,800 psi (12.4MPa).
2. Shear Bond: ASTM C 482: 50 psi (345kPa), minimum.
3. Freeze-Thaw Test: ASTM C 67: Less than 3 percent weight loss and no disintegration.
4. Thermal Resistance: ASTM C 177: 0.473 at 1.387 inches thick
5. Weight per square foot: 2014 FBC, ASTM C1670, 15 pounds, saturated.

B. Sizes and Shapes:

1. Stone Veneer. Broad range of colors including brown, tan, gray, buff, pink, yellow, white and black.
2. Split faces. Commonly used as an architectural stone siding for interior and exterior veneer applications.
3. Adhered Thin Veneer - 1.5 inch thick (plus or minus 0.25 inches). Lightweight (less than 15 lbs per square foot), precast stone that does not require a supporting masonry shelf. Used for interior or exterior applications such as siding, interior veneer and fireplaces:

    a) Flats.
    b) Pre-Cut Corners for the appearance of full depth stone
    c) Trim & Caps
    d) Mantels

2.3 ACCESSORIES

A. Expanded Metal Lath Paper Backed: ASTM C847; galvanized, self-furring mesh minimum 2.5 lb, backed with paper.

B. Expanded Metal Lath: ASTM C847, galvanized, self-furring, minimum 2.5 lb or 18 gauge.

C. Lath Anchorage: Tie wire, nails, screws and other metal supports, galvanized, of type and size to suit application and to rigidly secure materials in place.

D. Setting buttons or shims: Lead or plastic.

E. Joint Sealants and Joint Fillers: As specified in Section 07900.

2.4 ADHERED MASONRY VENEER INSTALLATION MATERIALS AND ACCESSORIES

A. Air and Water Barrier Membrane: LATICRETE® Air & Water Barrier ** to be thin, cold applied, single component liquid and load bearing. Waterproofing Membrane to be non-toxic, non-flammable, and non-hazardous during storage, mixing, application and when cured or approved equal:

1. Air Barrier Test (AC 212): Pass
2. Air Permeance (ASTM E2178): Pass
3. Elongation @ break (ASTM D751): 20-30%
4. 7 day Tensile Strength (ANSI A118.10): >265 psi (1.8 MPa)
5. 7 day Shear Bond Strength (ANSI A118.10): >200 psi (1.4 MPa)
6. 28 Day Shear Bond Strength (ANSI A118.4): >214 psi (1.48 – 2.4 MPa)
7. Service Rating (TCA/ASTM C627): Extra Heavy
8. Total VOC Content: < 0.05 mg/m3

B. Epoxy Waterproofing Flashing Mortar: LATAPOXY® Waterproof Flashing Mortar to be 3 component epoxy, trowel applied specifically designed for use under adhered masonry veneer:

1. Breaking Strength (ANSI A118.10): 450-530 psi (3.1-3.6 MPa)
2. Waterproofness (ANSI A118.10): No Water penetration
3. 7 day Shear Bond Strength (ANSI A118.10): 110-150 psi (0.8-1 MPa)
4. 28 Day Shear Bond Strength (ANSI A118.10): 90-120 psi (0.6–0.83 MPa)
5. 12 Week Shear Bond Strength (ANSI A118.10): 110-130 psi (0.8-0.9 MPa)
6. Total VOC Content: <3.4 g/L
7. Color to match stone.

C. Cementitious backer board units: size, thickness and installation as specified by cement backer board manufacturer, complying with ANSI A118.9 at interior walls.

D. Latex-Portland Cement Mortar for leveling beds and scratch/plaster coats: LATICRETE MVIS Premium Mortar Bed or approved equal to meet the following physical requirements:

1. Compressive Strength (ANSI A118.4 Modified): >4000 psi (27.6 MPa)
2. Water Absorption (ANSI A118.6): ≤ 5%
3. Service Rating (TCA/ASTM C627): Extra Heavy
4. Smoke & Flame Contribution (ASTM E84 Modified): 0
5. Total VOC Content: < 0.05 mg/m^3

6. Color to match stone

E. Latex Portland Cement Mortar: MVIS Hi Bond Veneer Mortar ** to be weather, frost, shock resistant, non-flammable and meet the following physical requirements:

1.Compressive strength (ANSI A118.4): >2500 psi (17.2 MPa)
2. Bond strength (ANSI A118.4): >450 psi (3.1 MPa)
3. Smoke & Flame Contribution (ASTM E84 Modified): 0
4. Total VOC Content: < 0.05 mg/m^3

F. Latex Portland Cement Pointing Mortar / Grout: MVIS Pointing Mortar to be weather, frost and shock resistant, as well as meet the following physical requirements:
1. Compressive Strength (ASTM C91): 3500 psi (24.1 MPa)
2. Smoke & Flame Contribution (ASTM E84 Modified): 0
3. Total VOC Content: < 0.00 mg/m^3

G. Expansion and Control Joint Sealant: MVIS Silicone Sealant to be a one component, neutral cure, exterior grade silicone sealant and meet the following requirements:

1. Tensile Strength (ASTM C794): 280 psi (1.9 MPa)
2. Hardness (ASTM D751; Shore A): 25 (colored sealant) /15 (clear sealant)
3. Weather Resistance (QUV Weather-ometer): 10000 hours (no change)

H. Spot Bonding Epoxy Adhesive: LATAPOXY 310 Stone Adhesive (Standard or Rapid Grade) for installing adhered masonry veneer, brick and stone over vertical and overhead surfaces shall be high strength, high temperature resistant, non-sag and shall meet the following physical requirements:

1. Thermal Shock Resistance (ANSI A118.3): >1000 psi (6.9 MPa)
2. Water Absorption (ANSI A118.3): 0.1 %
3. Compressive Strength (ANSI A118.3): >8300 psi (57.2 MPa)
4. Shear Bond Strength (ANSI A118.3 Modified): >730 psi (5 MPa)

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Do not begin installation until backing structure is plumb, bearing surfaces are level and substrates are clean and properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Examination: Examine conditions and proceed with work in accordance with Section 01700.
1. Verify that field conditions are acceptable and are ready to receive work.
2. Verify items provided by other Sections of work are properly sized and located.
3. Verify that built in items are in proper location and ready for roughing into masonry work.
4. Verify correct product prior to installation.

5. Verify that masonry and concrete substrates do not have residual coatings (paint, bond breaker, curing compounds, etc.) present, which may affect bonding of mortar to substrate.

    a. Install metal lath if residual coatings are present on substrate.

6. Consult Owner and manufacturer if deficiencies exist. Correct deficiencies in accordance with stone manufacturer's recommendations.

D. Protect surrounding area from possible damage during installation work.

E. Initiating installation constitutes Installer's acceptance of existing surfaces and substrate.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION OF ADHERED MASONRY THIN VENEER - MORTARED JOINTS

A. General: Install in accordance with current versions of American National Standards Institute, Inc. (ANSI) "A108 American National Standard Specifications for Installation of Ceramic Tile" and TCNA "Handbook for Ceramic Tile Installation." Cut and fit adhered masonry veneer neatly around corners, fittings, and obstructions. Perimeter pieces to be minimum half unit of stone. Maintain masonry courses to uniform dimensions. Form vertical and horizontal joints of uniform thickness. Install divider strips at junction of flooring and dissimilar materials.

B. Lath & Plaster Method: Install cleavage membrane / water resistive barrier complying with current revision of ANSI A108.02 (3.8 Membrane or cleavage membrane). Install metal lath complying with the current revision of ANSI A108.01 (3.3 Requirements for lathing and portland cement plastering), ANSI A108.02 (3.6 Metal lath) and A108.1A (1.0 – 1.2, 1.4, & 5.1). Apply latex-portland cement mortar as scratch/leveling coat over wire lath, concrete or masonry in compliance with current revision of ANSI A108.01 (3.3.5.1) and A108.1A (1.4). Float surface of scratch/leveling coat plumb, true and allow mortar to set until firm. For installation of adhered masonry veneer follow Direct Adhere Method (§ 3.3 D).

C. Direct Adhere Method to Install Masonry Veneer: Install latex portland cement mortar in compliance with current revisions of ANSI A108.02 (3.11), A108.1B and ANSI A108.5. Use the appropriate trowel notch size to ensure proper bedding of the adhered masonry veneer, selected so that 100% coverage of the back surface of the Thin Adhered Veneer is achieved. Work the latex portland cement mortar into good contact with the substrate and comb with notched side of trowel. Spread only as much latex portland cement mortar as can be covered while the mortar surface is still wet and tacky. When installing large format (>8" x 8"/200mm x 200mm) units, spread latex portland cement mortar onto the back of (i.e. 'back-butter') each piece/unit in addition

to troweling latex portland cement mortar over the substrate. Beat each piece/unit into the latex portland cement mortar with a beating block or rubber mallet to insure 100% full bedding and flatness. Allow installation to set until firm. Clean excess latex portland cement mortar from adhered masonry veneer face and joints between pieces.

1. Pattern Bond:

    a. Layout work in advance and distribute color range of stone uniformly over total work area.
    b. Lay stone with face exposed.
    c. Take care to avoid concentration of any one color to any one wall surface.
    d. Maintain uniform joints, as stone allows.
    e. Do not use stacked vertical joints.

D. Expansion and Control Joints: Provide control or expansion joints as needed per the manufacturers installation requirements.

1. Substrate joints must carry through, full width, to surface of adhered masonry veneer.
2. Install expansion joints in adhered masonry veneer work over construction/cold joints or control joints in substrates.
3. Install expansion joints where adhered masonry veneer abut restraining surfaces (such as perimeter walls, curbs, columns), changes in plane and corners.
4. Joint width and spacing depends on application and should be determined by the project design team.
5. Joint width: ≥ ⅛” (3mm) and ≤ 1” (25mm).
6. Joint width: depth ~2:1 but joint depth must be ≥ ⅛” (3mm) and ≤ ½” (12mm).
7. Layout (field defined by joints): 1:1 length: width is optimum but must be ≤ 2:1. Remove all contaminants and foreign material from joint spaces/surfaces, such as dirt, dust, oil, water, frost, setting/pointing materials, sealers and old sealant/backer. Use LATICRETE Latasil™ 9118 Primer for underwater and permanent wet area applications, or for porous stone (e.g. limestone, sandstone etc.) installations. Install appropriate backing material (e.g. closed cell backer rod) based on expansion joint design and as specified in § 07920. Apply masking tape to face of adhered masonry veneer, brick or stone veneer. Use caulking gun, or other applicator, to completely fill joints with sealant. Within 5-10 minutes of filling joint, ‘tool’ sealant surface to a smooth finish. Remove masking tape immediately after tooling joint. Wipe smears or excess sealant off the face of adhered masonry veneer or other absorptive surfaces immediately.

G. Adjusting: Correction of defective work for a period of one (1) year following substantial completion, return to job and correct all defective work. Defective work includes, without limitation, adhered masonry veneer units stones broken in normal abuse due to deficiencies in setting bed, loose grout/pointing mortar, and all other defects which may develop as a result of poor workmanship.

1. Control and Expansion Joints:

a. Keep joints open and free of debris.
b. Coordinate control joints as specified in Section 07 90 00 for sealant performance.

2. Sealant Recesses:
   a. Provide open joints 3/4 inch deep and 1/4 inch wide, where masonry meets doors, windows, and other exterior openings.
   b. Coordinate sealant joints as specified in Section 07 90 00 for sealant performance.

3. Cutting and Fitting:
   a. Cut and fit thin veneer stone for chases, pipes, conduit, sleeves, grounds, and other penetrations and adjacent materials.
   b. Coordinate with other work to provide correct size, shape, and location.

4. During progress of the work, cover top of unfinished stone masonry work for protection from weather.

3.4 INSTALLATION BUILDING VENEER

A. Install building veneer stone and mortar in accordance with manufacturer's instructions and ACI 530.1/ASCE 6/TMS 602.

B. Maintain masonry courses to uniform dimensions. Form vertical and horizontal joints of uniform thickness.

3.5 CLEANING

A. Keep face of stone free of mortar as work progresses.

B. If residual mortar is on face of stone, allow to dry partially and brush mortar off surface and sponge off residue.

C. When work is completed and mortar has set for 2 to 3 days, clean surface from top to bottom using mild masonry detergent acceptable to natural stone manufacturer.

D. Do not use harsh cleaning materials or methods that could damage stone.

E. Do not use metal brushes or acids for cleaning.

3.6 PROTECTION

A. Protect installed natural stone veneer to ensure that, except for normal weathering, stone will be without damage or deterioration at time of Substantial Completion.

B. Touch-up, repair, or replace damaged stone before Substantial Completion.

END OF SECTION 04412

SECTION 04810 - UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Concrete masonry units.
2. Mortar and grout.
3. Steel reinforcing bars.
4. Masonry-joint reinforcement.
5. Ties and anchors.
6. Miscellaneous masonry accessories.

B. Products Installed but not Furnished under This Section:
1. Cast-stone trim in unit masonry.

C. Related Requirements:
1. Section 051200 "Structural Steel Framing" for installing anchor sections of adjustable masonry anchors for connecting to structural steel frame.
2. Section 07190 "Water Repellents" for water repellents applied to unit masonry assemblies.
3. Section 07620 "Sheet Metal Flashing and Trim" for exposed sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Precast Concrete Sill Units: Show sizes, profiles, and locations of each precast unit required.
3. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
4. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

1.6 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
   1. Submittal is for information only. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

B. Qualification Data: For testing agency.

C. Material Certificates: For each type and size of the following:
   1. Masonry units.
      a. Include data on material properties.
      b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
   2. Cementitious materials. Include name of manufacturer, brand name, and type.
   3. Mortar admixtures.
   4. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
   5. Grout mixes. Include description of type and proportions of ingredients.
   6. Reinforcing bars.
   7. Joint reinforcement.
   8. Anchors, ties, and metal accessories.

D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
   1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
   2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.

F. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

B. Mockups: Build mockups to verify to set quality standards for materials and execution.
   1. Build mockup of typical wall area.
   2. Build mockups for typical exterior and interior walls in sizes approximately 72 inches long by 48 inches high by full thickness.
      a. Include lower corner of window opening, framed with precast sill units, at upper corner of exterior wall mockup. Make opening approximately 12 inches wide by 16 inches high.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
   1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
   2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
   1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
   2. Protect sills, ledges, and projections from mortar droppings.
   3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
   4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
   1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
   1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
   2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

2.3 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet vertically and horizontally of a walking surface.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
   1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.4 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
   1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
   2. Provide bullnose units for outside corners unless otherwise indicated.

B. CMUs: ASTM C 90.
   1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi.
   2. Density Classification: Normal weight.
   3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
   4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
   5. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

2.5 MASONRY LINTELS

A. General: Provide one of the following:

B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.6 PRECAST SILL UNITS

A. Precast Concrete: Compressive strength 4,000 - 6,000 PSI at 28 days, with portland white cement conforming to ASTM C-150.

B.

1. Reinforcing M13 #4, Grade 60 rebar.
2. Aggregate-Fine carefully graded and washed natural sand conforming to ASTM C-33.
3. Shape as indicated on the drawings.

2.7 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
   1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
   1. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
   2. Pigments shall not exceed 10 percent of portland cement by weight.

D. Aggregate for Mortar: ASTM C 144.
   1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
   2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
   3. White-Mortar Aggregates: Natural white sand or crushed white stone.
   4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

E. Aggregate for Grout: ASTM C 404.

F. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for glazed or pre-faced masonry units (and approved for such use by manufacturer of units); in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's colors.

G. Refractory Mortar Mix: Ground fireclay or non-water-soluble, calcium aluminate, medium-duty refractory mortar that passes ASTM C 199 test; or an equivalent product acceptable to authorities having jurisdiction.

H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      a. BASF Corporation.
      b. Euclid Chemical Company (The); an RPM company.

I. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.

J. Water: Potable.

2.8 REINFORCEMENT

A. Uncoated-Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

C. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.
1. Interior Walls: Hot-dip galvanized carbon steel.
2. Exterior Walls: Hot-dip galvanized carbon steel.
3. Wire Size for Side Rods: 0.187-inch diameter.
4. Wire Size for Cross Rods: 0.148-inch diameter.
5. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
6. Provide in lengths of not less than 10 feet , with prefabricated corner and tee units.

D. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods.

2.9 TIES AND ANCHORS

A. General: Ties and anchors shall extend at least 1-1/2 inches into masonry but with at least a 5/8-inch cover on outside face.

B. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch-diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.
2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.

C. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.060-inch-thick steel sheet, galvanized after fabrication.

2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.
3. Corrugated-Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.060-inch-thick steel sheet, galvanized after fabrication with dovetail tabs for inserting into dovetail slots in concrete.

D. Partition Top Anchors: 0.105-inch-thick metal plate with a 3/8-inch-diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

E. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.
1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

F.

2.10 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.11 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime mortar unless otherwise indicated.
3. For exterior masonry, use portland cement-lime mortar.
4. For reinforced masonry, use portland cement-lime mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
   1. For masonry below grade or in contact with earth, use Type M.
   2. For reinforced masonry, use Type M or Type S.
   3. For mortar parge coats, use Type S or Type N.
   4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
   5. For interior non-load-bearing partitions, Type O may be used instead of Type N.
      a.

D. Grout for Unit Masonry: Comply with ASTM C 476.
   1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
   2. Proportion grout in accordance with ASTM C 476, paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
   3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
   2. Verify that foundations are within tolerances specified.
   3. Verify that reinforcing dowels are properly placed.
   4. Verify that substrates are free of substances that impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested according to ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:
   1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
   2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
   3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:
   1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
   2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
   3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
   4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
   5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
   6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet or 1/2-inch maximum.
   7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:
   1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
   2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.

3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
1. Install compressible filler in joint between top of partition and underside of structure above.
2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.

3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

A. Lay CMUs as follows:
1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Install clay flue liners to comply with ASTM C 1283. Install flue liners ahead of surrounding masonry. Set clay flue liners in full bed of refractory mortar 1/16 to 1/8 inch thick. Strike joints flush on inside of flue to provide smooth surface. Maintain expansion space between flue liner and surrounding masonry except where surrounding masonry is required to provide lateral support for flue liners.

D. Set precast sill units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Allow cleaned surfaces to dry before setting.
3. Wet joint surfaces thoroughly before applying mortar.
4. Rake out mortar joints for pointing with sealant.

E. Rake out mortar joints at pre-faced CMUs to a uniform depth of 1/4 inch and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.

F. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
1. For glazed masonry units, use a nonmetallic jointer 3/4 inch or more in width.

G. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

H. Cut joints flush where indicated to receive waterproofing or air barriers unless otherwise indicated.

3.6 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
   1. Space reinforcement not more than 16 inches o.c.
   2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
   3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
   1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
   2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
   3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.8 CONTROL JOINTS

A. General: Install control-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry using one of the following methods:
   1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
   2. Install preformed control-joint gaskets designed to fit standard sash block.
   3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
   4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

C. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch.

D.

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.
2.

3.9 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.
1.

3.10 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength.

F. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

G. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

H. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.

I. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

J. Prism Test: For each type of construction provided, according to ASTM C 1314 at 28 days.

3.12 PARGING

A. Parge exterior faces of below-grade masonry walls, where indicated, in two uniform coats to a total thickness of 3/4 inch. Dampen wall before applying first coat and scarify first coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom.

C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.13 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
   3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
   4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
   5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
   6. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
   7. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
   8. Clean stone trim to comply with stone supplier's written instructions.
   9. Clean limestone units to comply with recommendations in ILI's "Indiana Limestone Handbook."

3.14 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
   1. Crush masonry waste to less than 4 inches in each dimension.
   2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
   3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

C. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

D. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04810

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Structural steel.
2. Prefabricated building columns.
3. Field-installed shear connectors.
4. Grout.

B. Related Requirements:

1. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.
2. Section 053100 "Steel Decking" for field installation of shear connectors through deck.
3. Section 055000 "Metal Fabrications" for shelf angles not attached to structural-steel frame, miscellaneous steel fabrications.
4. Section 099113 "Exterior Painting" and Section 099600 "High-Performance Coatings" for surface-preparation and priming requirements.
5. Section 133419 "Metal Building Systems" for structural steel.

1.3 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.

C. Heavy Sections: Rolled and built-up sections as follows:

1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches (38 mm).
2. Welded built-up members with plates thicker than 2 inches (50 mm).
3. Column base plates thicker than 2 inches (50 mm).

D. Protected Zone: Structural members or portions of structural members indicated as "Protected Zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.

E. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

1.4 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
5. Identify members and connections of the Seismic-Load-Resisting System.
6. Indicate locations and dimensions of protected zones.
7. Identify demand critical welds.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:

1. Power source (constant current or constant voltage).
2. Electrode manufacturer and trade name, for demand critical welds.

D. Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, and fabricator.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural steel, including chemical and physical properties.

E. Product Test Reports: For the following:

1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength, bolt-nut-washer assemblies.
4. Shear stud connectors.
5. Shop primers.
6. Nonshrink grout.

F. Survey of existing conditions.

G. Source quality-control reports.

H. Field quality-control and special inspection reports.

1.8 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE.

C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 or to SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

E. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 3125/F 3125M, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering analysis by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using schematic details indicated and AISC 360.

B. Moment Connections: Type PR, partially or Type FR, fully restrained as indicated on the drawings.

C. Construction: Shear wall system.

2.2 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M

B. Channels, Angles: ASTM A 36/A

C. Plate and Bar: ASTM A 36/A 36M

D. Corrosion-Resisting Structural-Steel Shapes, Plates, and Bars: ASTM A 588/A 588M, Grade 50 (345).

E. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B structural tubing.

F. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.

1. Weight Class: As indicated on the drawings.
2. Finish: As indicated on the drawings.

G. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.

H. Steel Forgings: ASTM A 668/A 668M.

I. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM F 3125/F 3125M, Grade A325 (Grade A325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH (ASTM A 563M, Class 10S), heavy-hex carbon-steel nuts; and ASTM F 436/F 436M, Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F 959/F 959M, Type 325-1 (Type 8.8-1), compressible-washer type with plain finish.

B. High-Strength Bolts, Nuts, and Washers: ASTM F 3125/F 3125M, Grade A490 (Grade A490M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH (ASTM A 563M, Class 10S), heavy-hex carbon-steel nuts; and ASTM F 436/F 436M, Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F 959/F 959M, Type 490-1 (Type 10.9-1), compressible-washer type with plain finish.

C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM F 3125/F 3125M,Grade A325 (Grade A325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH (ASTM A 563M, Class 10S), heavy-hex carbon-steel nuts; and ASTM F 436/F 436M, Type 1, hardened carbon-steel washers.

1. Finish: Hot-dip or mechanically deposited zinc coating.

2. Direct-Tension Indicators: ASTM F 959/F 959M,Type 325-1 (Type 8.8-1), compressible-washer type with mechanically deposited zinc coating finish.

D. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

E. Headed Anchor Rods: ASTM F 1554, as indicated on the drawings, straight.

1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
4. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C or Mechanically deposited zinc coating, ASTM B 695, Class 50.

F. Threaded Rods: ASTM A 36/A 36M.

1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
2. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
3. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C or Mechanically deposited zinc coating, ASTM B 695, Class 50.

G. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

H. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

I. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

2.4 PRIMER

A. Primer: Comply with Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."

B. Primer: SSPC-Paint 25, [Type I] [Type II], zinc oxide, alkyd, linseed oil primer.

C. Primer: SSPC-Paint 25 BCS, [Type I] [Type II], zinc oxide, alkyd, linseed oil primer.

D. Primer: SSPC-Paint 23, latex primer.

E. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

F. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

2.5 GROUT

A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, mechanically thermal cut or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning," SSPC-SP 2, "Hand Tool Cleaning," or SSPC-SP 3, "Power Tool Cleaning."

F. Welded Door Frames: Build up welded door frames attached to structural-steel frame. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches (250 mm) o.c. unless otherwise indicated.

G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.7 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: As indicated on the drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.8 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.
6. Surfaces enclosed in interior construction.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
5. SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning."
6. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
7. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
8. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
9. SSPC-SP 8, "Pickling."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils (0.038 mm).

2.9 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
2. Galvanize lintels, shelf angles, and welded door frames attached to structural-steel frame and located in exterior walls.

2.10 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

D. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Baseplates, Bearing Plates, and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: As indicated on the drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 PREFABRICATED BUILDING COLUMNS

A. Install prefabricated building columns to comply with AISC 360, manufacturer's written recommendations, and requirements of testing and inspecting agency that apply to the fire-resistance rating indicated.

3.6 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
c. Ultrasonic Inspection: ASTM E 164.
d. Radiographic Inspection: ASTM E 94.

E. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

3.7 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

D. Touchup Priming: Cleaning and touchup priming are specified in Section 099600 "High-Performance Coatings."

END OF SECTION 051200

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SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Roof deck.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.
2. Section 051200 "Structural Steel Framing" for shop- and field-welded shear connectors.
3. Section 054400 “Cold-Formed Metal Trusses”

1.3 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. Evaluation Reports: For steel deck, from ICC-ES.

D. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 ROOF DECK

A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:

1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), [Grade 33 (230)] [Grade 40 (275)] [Grade 80 (550)] minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.

a. Color: [Manufacturer's standard] [Gray] [White] [Gray top surface with white underside].

2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), G90 (Z275) zinc coating.
3. Deck Profile, Depth, and Sheet Thickness: As indicated on the Drawings

4. Span Condition: Triple span or more.
5. Side Laps: Overlapped.

2.3 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 12 (4.8-mm) minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Galvanizing Repair Paint: ASTM A 780/A 780M.

G. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches (38 mm) long, and as follows:

1. Weld Diameter and Spacing: As indicated on the Drawings

B. Side-Lap and Perimeter Edge Fastening: As indicated on the Drawings

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:

1. End Joints: Lapped 2 inches (51 mm) minimum.

D. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

E. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Field welds will be subject to inspection.

C. Prepare test and inspection reports.

3.5 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

END OF SECTION 053100

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SECTION 05312- ARCHITECTURAL(ACOUSTICAL) CEILING DECK SYSTEM

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Architecturally exposed and acoustical metal-ceiling-deck system and accessories. Acoustical perforated panels to be used at interior applications, and non-perforated & non acoustical panels to be used at exterior canopies.

1.3 RELATED SECTIONS

A. Section 05310 - Steel Decking.

B. Section 05500 - Metal Fabrications.

C. Section 07210 – Building Insulation.

D. Section 07411 – Metal Roof Panels

E. Section 07250 - Weather Barriers.

1.4 REFERENCES

A. AAMA 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) & Zinc- Aluminum Coated Steel Substrates.

B. ASTM A 621 - Standard Specification for Forming Steel (FS), Sheet and Strip, Carbon, Hot-Rolled

C. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

D. ASTM A 780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

E. ASTM A 792 - Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process

F. ASTM A 924/A 924M - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

G. ASTM B 117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.

H. ANSI/ASTM C 423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

I. ASTM D 523 - Standard Test Method for Specular Gloss.

J. ASTM D 968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.

K. ASTM D 4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films

L. ASTM D 2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates

M. ASTM D 3363 - Standard Test Method for Film Hardness by Pencil Test

N. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials

O. AISI - North American Specification for the Design of Cold-Formed Steel Structural Members.

P. ICC-ES Evaluation Report ESR-3477 - New Millennium Versa-Wedge Steel Deck Hangers.

Q. AWS D1.3 - Structural Welding Code - Sheet Steel.

R. SDI Code of Standard Practice - 2014

S. SDI RD - Standard for Steel Roof Deck

T. SDI SPD2 - Standard Practice Details with enhanced aesthetic standards established and adopted by the Manufacturer with enhanced aesthetic standards established and adopted by the Manufacturer.

U. SDI MOC2 - Manual of Construction with Steel Deck

V. UL 580 - Tests for Uplift Resistance of Roof Assemblies.

W. UL - Certification Directory.

1.5 DESIGN / PERFORMANCE REQUIREMENTS

A. Ceiling-deck system assembly specified shall comply with the following:
   1. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's North American Specification for the Design of Cold-Formed Steel Structural Members.
   2. AAMA 621, Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) & Zinc- Aluminum Coated Steel Substrates
   3. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   4. ASTM A 792 - Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated

by the Hot-Dip Process.

5. ASTM A 924/A 924M - Standard Specification for General Requirements for Steel Sheet, Metallic- Coated by the Hot-Dip Process.
6. ANSI/ASTM C 423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
7. ICC - ES Evaluation Report(s) for conformance with the 2012, 2009 and 2006 International Building Code.
8. SDI Publication No.31 - Design Manual for Composite Decks, Form Decks and Roof Decks with enhanced aesthetic standards established and adopted by the Manufacturer.
9. SDI MOC2 - Manual of Construction with Steel Deck.
10. SDI SPD2 - Standard Practice Details with enhanced aesthetic standards established and adopted by the Manufacturer with enhanced aesthetic standards established and adopted by the Manufacturer.
11. UL Certification's Directory.
12. UL 580 - Tests for Uplift Resistance of Roof Assemblies.

B. Ceiling-deck system assembly specified shall meet the following performance characteristics:
   1. Superimposed service-phase design loads and locations applied to assembly shall be established and approved by the Architect and the Engineer of Record (EOR).
   2. When design loads vary in magnitude and location over the deck surfaces, conform with the EOR's design Drawings denoting the distribution and intensity of the varying loads.
   3. Uniform Live Load Requirements: Submit certified design confirming the uniform live load carrying capacities of the steel deck section(s).
      a. Design Loads: Minimum 20 lbs./ft.2 or greater as indicated on the Drawings.
   4. Concentrated Load Requirements: Submit certified design confirming the concentrated load carrying capacities of the steel deck section(s).
      a. Design Loads: 250 lbs applied at mid-span in the installed condition or greater as indicated on the Drawings.
   5. Diaphragm Load Requirements: Submit certified design confirming the shear strength and stiffness capacities of the steel deck section(s).
      a. Design Loads: As directed indicated on the Drawings.
      b. Ultimate Wind Uplift Requirements: Submit certified design confirming the wind uplift capacities of the steel deck section(s).
         1) Design Loads: Minimum -49.9 lbs./ft.2 or greater as indicated on the Drawings.
   6. Deflection Limits: Maximum deflection of steel deck section(s) subjected to uniformly applied or concentrated loading shall not exceed the lesser of 1/240th of span length or 1 inch (25 mm) or less as indicated on the Drawings.
   7. Allowance for Thermal Movement: Deck cladding system assembly shall accommodate in-plane thermal contraction and expansion movements based on design data indicated on the Drawings.

1.6 SUBMITTALS

A. Submit under provisions of Section 01330 – Submittal Procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Deck property information for the proposed deck units.
   2. Preparation instructions and recommendations.
   3. Storage and handling requirements and recommendations.
   4. Erection instructions.

C. Shop Drawings: Show location, connections, bearing on supports, methods of anchoring, coordination of the fastener locations of the structural insulated roof deck panels, attachment of accessories, adjusting plate details and the manufacturer's erection instructions and pertinent details.

D. Shop Drawings:
   1. Showing plans, sections, elevations, layouts, profiles and product component locations, including anchorage, bracing, fasteners, accessories and finishes, sealed by a Professional Engineer registered in the state of the project.
   2. Indicate component details, framed openings, bearing, anchorage, loading, welds, type and location of fasteners, and accessories.
   3. Indicate method for securing studs and other components to tracks and for framing connections.
   4. Submit calculations for loadings and stresses under Professional engineer's seal registered in the state of the project.

E. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

F. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

G. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.7 QUALITY ASSURANCE

A. Manufacturer with documented evidence of not less than 10 years of successful experience in the placement of architecturally exposed ceiling-deck systems on projects of similar size, scope and end use.

B. Installer Qualifications: Company certified by the manufacturer and specializing in performing Work of this section with minimum 5 years documented experience.

C. Welding: Qualify procedures and personnel according to AWS D1.3, Structural Welding Code - Sheet Steel.

D. Design structural elements under direct supervision of Professional Engineer experienced in design of this Work and registered in the state of the project.

E. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, and manufacturer's installation instructions.

F. Welding Standards: Comply with applicable provisions AWS D1.1 and AWS D1.3 of the Structural Welding Code.

G. Qualify welding processes and welding operators in accordance with AWS Standard Qualification Procedure.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store products in compliance with Manufacturer's printed recommendations.

B. Separate sheets and store on dry wood sleepers; slope for positive drainage. Protect with a waterproof covering and ventilate to avoid condensation.

C. Handle factory-painted deck panel surfaces with utmost care during lifting, unbundling. separating, spreading and placement phases. Work shall be performed in a manner that minimizes abrasion between sheets and between painted surfaces and structural supports.

1.9 SEQUENCING

A. Coordinate installation of sound-absorbing insulation strips and non-corrosive spacers (lath when required) in the ribs of cellular acoustical deck to ensure protection of insulation strips against damage from effects of weather and other causes.

1.10 WARRANTY

A. Provide with the paint manufacturers 20 year film integrity limited warranty against cracking, peeling, checking or flaking under normal anticipated conditions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: New Millennium Building Systems, which is located at: 7575 W. Jefferson Ave.; Fort Wayne, IN 46804 ; Tel: 260-969-3500; Fax: 260-868-6002; Email: request info (info@newmill.com) or Architect approved equal.

B. Substitutions: Not permitted.

2.2 ARCHITECTURAL CEILING DECK

A. Materials General:
1. Minimum Thickness: 20 GA (0.0359-inch) or greater as determined by design.
2. Minimum Yield Strength: 40,000-1b/inch2.
3. Protective Coating: Galvanized (zinc) coating weight.
a. G-90

B. Deck Panel Type: Provide the following deck type(s) to the applications indicated on the Drawings.
1. Type: Versa-Dek 2.0 S ES, 2 inches deep re-entrant (dovetail) rib-shaped panel sections without longitudinal stiffener.
a. Type: Standard deck with the following.
1) Removable access panels.
2) Acoustical treatments.
b. Depth: 2 inches.
c. Pitch: 6 inches.
d. Cover Width: 24 inches.
e. Side-lap Formation: Nestable, self-aligning.

2. Type: Cellular Linear Panels: Linear Panels:
   a. Steel Materials:
      1) Thickness: Minimum 20 GA or greater as determined by design.
      2) Minimum Yield Strength: 40,000-1b/inch2.
   b. Appearance: Flat with continuous longitudinal minor stiffening ribs uniformly spaced 6 inches apart.
   c. Attachment to Deck Panel Sections:
   d. Method: Resistive Spot Welding process.
      1) Weld size and spacing as determined by Manufacturer to assure unified, composite strength.
3. Removable Access Covers:
   a. Factory roll formed to tightly match bottom formation of the ceiling-deck panel section. Cover to assure a smooth transition of aesthetic surfaces.
   b. Locations: One each per ceiling penetration denoted on the Reflected Ceiling Plans or as required for access to equipment based on architect's approval of the panel location. Position ceiling penetration at mid-length of access cover. Maximum 3 penetrations per deck span spaced minimum 2 feet apart.
   c. Length: 7 feet maximum.
   d. Identification: Labels placed on the non-exposed side marked to correspond to positions denoted on the approved ceiling deck installation drawings.
   e. Paint Coatings: Paint to match coating system applied to exposed ceiling-side of deck panel sections.
   f. Modifications to Ceiling-deck Panel Sections:
      1) Openings: Factory clean cut, rectangular, one per ceiling-deck penetration.
      2) Length: As required to assure adequate clearance for access and attachment of field assembled service lines and equipment; Maximum 6 feet.
      3) Reinforcement of deck panels: As determined by Manufacturer to re-establish structural properties, if required.
4. Screws: Low profile, pan-head type of size and quantity as determined by Manufacturer.
5. Intermediate Support Devices for Service Lines and/or Equipment Between Factory Cut Openings:
   a. Manufacturer's Designation: Dek Strut brackets.
   b. Factory installed.
6. Length: Deck panel sections shall be installed in lengths to create two-span, three-support conditions.
7. Sections not installed in minimum two-span lengths shall be as indicated on the ceiling-deck system installation drawings.
   a. Minimum end bearing: 1-1/2-inch.
   b. Spacing and attachment as determined by Manufacturer.

C. Acoustical Treatments: Architectural ceiling deck (Interior applications only, non-perforated panels at exterior canopies).
1. Acoustical Properties:
   a. NCR Rating:
      1) Versa-Dek 2.0 S ES Acoustical = 0.95- 1.15
2. Acoustical Insulation Batts:

a. Factory and Field installed.
b. Factory and Field installed over non-corrosive plastic lath spacer.
1) Type: Unwrapped fiberglass, formaldehyde free.
2) Density: 3.0 lblft3.
3) Dimensions: Size as determined by Manufacturer to assure minimum NRC rating value required.

D. Paint Coatings: Manufacturer shall apply uniform, factory-applied coatings, combining steel sheet, passivation, pre-treatment primer and finish top-coat paint where specified to deck panel sections. Coatings shall comply with AAMA 621.
1. Non-architecturally exposed side deck panel surfaces:
a. Continuous coil-coated and oven-cured:
1) Versa-Cote Ultra G-P.
2. Architecturally exposed ceiling-side deck panel surfaces: Protect pre-finished deck with craft-paper interleafing between deck panel surfaces.
3. Interior application shall be wood grained simulated finish, as selected from manufacture’s full range wood grained colors.
4. Exterior application shall be solid color white.

E. Fasteners
1. Welded attachment of any architectural ceiling-deck system assembly component is not permitted unless expressly allowed in writing by manufacturer.
2. Mechanical fasteners for deck panel to support steel not exceeding 3/16 inch (5 mm) thickness and deck panel side-lap attachments. All fasteners shall be concealed and not exposed at the finish face of the panel.
a. Hex-head, self-drilling screws with 300 series stainless steel over hex washer head with integrated EDPM washer; thermo-set polyester film over zinc-plated carbon steel shanks and powder paint coated heads color matched to the top-coat paint finish of the deck panels
b. Buildex "SCOTS"; AD Cladding; Use in aggressive environments thermo-set polyester film over zinc-plated carbon steel heads and shanks, integrated EPDM washer and powder paint coated heads color matched to the top-coat paint finish of the deck panels.
c. Buildex "MAX1SEAL"; AD Cladding; Use in non-aggressive environments thermo-set polyester film over zinc-plated carbon steel heads and shanks
d. Buildex "TEKS"; Use in non-aggressive interior deck ceiling applications.
e. Screws attaching two steel components with a combined material thickness less than 0.095-inch shall possess back-out resistant threads.
f. Size, Spacing and Location: As indicated in ceiling-deck system installation drawings.
3. Type: Mechanical fasteners for deck panels to support steel equal to or greater than 3/16 inch thick:
a. Description: Powder-actuated pins with integral washer and knurled shanks of diameter and length matched by Pin Manufacturer to the steel support member's base thickness.
b. Size, Spacing and Location: As indicated in ceiling-deck system installation drawings.

F. Accessories:

1. Provide Ridge and Valley Plates, Butt Plates, Z-Closures, Finish Strips, Sump Pans and Cell Closures as required.
2. Use size, spacing and location as indicated in ceiling-deck system installation drawings

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not install roof deck until supporting construction is in place.

B. Examine support framing and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work of this section.

C. If supporting construction is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Locate deck bundles to prevent overloading of support members.

3.3 INSTALLATION - GENERAL

A. Install deck panels and accessories in accordance with the Contract Documents approved installation drawings and requirements of this Section. Fasteners shall not be exposed at the finish face of the decking.

B. Place each deck panel on structural supports and adjust to final position with accurately aligned side laps and ends butted over structural supports to assure minimum specified end bearing length.

C. Cut and neatly fit deck units and accessories around openings and other work projecting through or adjacent to the decking.

D. Deck Panel Attachments to structural supports, deck side-lap, and deck perimeter edge attachments: Attach with fasteners of the type, size and spacing indicated on the ceiling-deck system installation drawings immediately after panel placement and alignment. Welded attachment of any architectural ceiling-deck system assembly component is not permitted unless expressly allowed in writing by Manufacturer. If allowed, specification language covering the execution of weld fastening shall accompany the written approval.
   1. Minimum Fastening Requirements:
      a. Fasten deck panels to supports as indicated on the ceiling-deck system installation drawings using mechanical fasteners, powder-actuated pins or self-drilling screws.
      b. Fasten side-laps of deck panel sections as indicated on the ceiling-deck system installation drawings. Fasten side-laps with No. 10 diameter self-drilling screws.
      c. Fasten perimeter edges of deck panels at maximum 12 inch on center intervals or as indicated on the ceiling-deck system installation

drawings. Use mechanical fasteners, powder-actuated pins or self-drilling screws.

2. Accessory Attachments: Anchor accessories to supporting members with self-drilling screws at 12 inches on center intervals or as Indicated on the ceiling-deck system installation drawings.

E. Reinforce unscheduled openings cut through roof deck in accordance with SDI MOC2 or as indicated on the ceiling-deck system Installation drawings or the structural drawings.

F. Do not expose the insulation batts to snow, rain, or condensation. Remove and replace any wet insulation.

3.4 INSPECTION AND REPAIR

A. Remove dirt and debris from entire deck surfaces before installation of any topping material.

B. Prior to the application of the roof covering, inspect completed portions of the ceiling-deck system assembly and correct any deficiencies and/or damage to the surface. Replace decking that has been damaged.

C. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint.

D. Repair Painting: Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Exterior non-load-bearing wall framing.

B. Related Requirements:

   1. Section 055000 "Metal Fabrications" for miscellaneous steel shapes, masonry shelf angles, and connections used with cold-formed metal framing.
   2. Section 092216 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at site determined by the Project Manager.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

   1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
   2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

C. Delegated-Design Submittal: For cold-formed steel framing.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product Certificates: For each type of code-compliance certification for studs and tracks.

D. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency or a qualified testing agency.

1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

E. Evaluation Reports: For nonstandard cold-formed steel framing post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association or the Steel Stud Manufacturers Association.

D. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

E. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Dietrich

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.

B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: [As indicated on Drawings] <Insert design loads>.
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

a. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/360 of the wall height.

3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F (67 deg C).
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

a. Upward and downward movement of 1/2 inch (13 mm)

5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:

1. Wall Studs: AISI S211.
2. Headers: AISI S212.
3. Lateral Design: AISI S213.

D. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency acceptable to authorities having jurisdiction.

2.3 COLD-FORMED STEEL FRAMING MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:

1. Grade: ST33H (ST230H), Minimum
2. Coating: G60 (Z180), Minimum

B. Steel Sheet for Vertical Deflection and Drift Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: 33 (230), Minimum
2. Coating: G60 (Z180), Minimum

2.4 LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: [0.0329 inch (0.84 mm)] [0.0428 inch (1.09 mm)] [0.0538 inch (1.37 mm)] [0.0677 inch (1.72 mm)] [0.0966 inch (2.45 mm)] <Insert dimension>.
2. Flange Width: [1-3/8 inches (35 mm)] [1-5/8 inches (41 mm)] [2 inches (51 mm)] [2-1/2 inches (63 mm)] <Insert dimension>.
3. Section Properties: <Insert minimum allowable calculated section modulus, moment of inertia, and allowable moment>.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:

1. Minimum Base-Metal Thickness: [0.0329 inch (0.84 mm)] [0.0428 inch (1.09 mm)] [0.0538 inch (1.37 mm)] [0.0677 inch (1.72 mm)] [0.0966 inch (2.45 mm)] [Matching steel studs] <Insert dimension>.
2. Flange Width: [1-1/4 inches (32 mm)] <Insert dimension if manufacturer's standard width is insufficient>.

C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: [0.0329 inch (0.84 mm)] [0.0428 inch (1.09 mm)] [0.0538 inch (1.37 mm)] [0.0677 inch (1.72 mm)] [0.0966 inch (2.45 mm)] <Insert dimension>.
2. Flange Width: [1-3/8 inches (35 mm)] [1-5/8 inches (41 mm)] [2 inches (51 mm)] [2-1/2 inches (63 mm)] <Insert dimension>.
3. Section Properties: <Insert minimum allowable calculated section modulus, moment of inertia, and allowable moment>.

D. Steel Single- or Double-L Headers: Manufacturer's standard L-shapes used to form header beams, of web depths indicated, and as follows:

1. Minimum Base-Metal Thickness: [0.0329 inch (0.84 mm)] [0.0428 inch (1.09 mm)] [0.0538 inch (1.37 mm)] [0.0677 inch (1.72 mm)] [0.0966 inch (2.45 mm)] <Insert dimension>.
2. Top Flange Width: [1-1/2 inches (38 mm)] [1-5/8 inches (41 mm)] [2 inches (51 mm)] [2-1/2 inches (63 mm)] <Insert dimension>.
3. Section Properties: <Insert minimum allowable calculated section modulus, moment of inertia, and allowable moment>.

2.5 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Hole-reinforcing plates.
10. Backer plates.

2.6 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 36 threaded carbon-steel hex-headed bolts, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC193, ICC-ES AC58, or ICC-ES AC308 as appropriate for the substrate.

1. Uses: Securing cold-formed steel framing to structure.
2. Type: Torque-controlled expansion anchor or Torque-controlled adhesive anchor.
3. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 (A4) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

D. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.7 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20.

B. Cement Grout: Portland cement, ASTM C 150/C 150M, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C 1107/C 1107M, and with a fluid consistency and 30-minute working time.

D. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.

E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

2.8 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.

C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.

C. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch (6 mm) to ensure a uniform bearing surface on supporting concrete or masonry construction.

D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch (1.6 mm).

D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

H. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.4 LOAD-BEARING WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:

1. Anchor Spacing: 24 inches (610 mm)

B. Squarely seat studs against top and bottom tracks, with gap not exceeding 1/8 inch (3 mm) between the end of wall-framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:

1. Stud Spacing: 16 inches (406 mm)

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.

D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Align floor and roof framing over studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.

F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure.

G. Install headers over wall openings wider than stud spacing. Locate headers above openings. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.

1. Frame wall openings with not less than a double stud at each jamb of frame. Fasten jamb members together to uniformly distribute loads.
2. Install tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.

1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.

I. Install horizontal bridging in stud system, spaced vertically 48 inches (1220 mm) Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches (150 mm) deep.

2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges, and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

J. Install steel sheet diagonal bracing straps to both stud flanges; terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 ERECTION TOLERANCES

A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.6 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

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SECTION 054400 - COLD-FORMED METAL TRUSSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cold-formed steel framing in the form of the following:

1. Cold-formed steel trusses for roofs.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel trusses; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

C. Delegated-Design Submittal: For cold-formed steel trusses.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product test reports.

C. Evaluation Reports: For post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

D. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Product Tests: Mill certificates or data from a qualified independent testing agency.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Alpine TrusSteel; 6750 Forum Drive, Suite 305, Orlando, FL 32821; www.trussteel.com

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer registered in the State of Florida to design cold-formed steel trusses.

B. Structural Performance: Provide cold-formed steel trusses capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated on Drawings.
2. Deflection Limits: Design trusses to withstand design loads without deflections greater than the following:
   a. Roof Trusses: Vertical deflection of 1/360 of the span.

3. Design trusses to provide for movement of truss members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F (67 deg C).

C. Cold-Formed Steel Truss Standards: Unless more stringent requirements are indicated, trusses shall comply with the following:

1. Floor and Roof Systems: AISI S210.
2. Lateral Design: AISI S213.
3. Roof Trusses: AISI S214.

D. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

2.3 COLD-FORMED STEEL TRUSS MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:

1. Grade: ST50H (ST340H).
2. Coating: G90 (Z275)

2.4 ROOF TRUSSES

A. Roof Truss Members: Manufacturer's standard steel sections.

1. Connecting Flange Width: 2-1/2 inches (41 mm), minimum at top and bottom chords connecting to sheathing or other directly fastened construction.
2. Minimum Base-Metal Thickness: 0.0538 inch (1.37 mm).

2.5 TRUSS ACCESSORIES

A. Fabricate steel-truss accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for truss members.

B. Provide accessories of manufacturer's standard thickness and configuration unless otherwise indicated.

C. Provide Low Eave Single-Sloped Member between trusses at bearing.

1. Design Loads: As indicated on Drawings.
2. Flange Width: 3” minimum. Slope of top flange to match slope of roof.
3. Height: Match Truss Heel Height at the outside face of the bearing wall.
4. Minimum Base-Metal Thickness: 0.0538 inch (1.37 mm).
5. Coating: G90 (Z275)

D. Provide galvanized closure plates over trusses of manufacturer's standard thickness and configuration unless otherwise indicated.

1. At the ridge
2. At the eaves
3. At the hips

2.6 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 55, threaded carbon-steel hex-headed bolts, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Power-Actuated Fasteners: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

2.7 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A 780/A 780M.

B. Shims: Load-bearing, high-density multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as truss members supported by shims.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed steel trusses without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.

3.2 INSTALLATION

A. Install bridge, and brace cold-formed steel trusses according to AISI S200, AISI S202, AISI S214, and manufacturer's written instructions unless more stringent requirements are indicated.

1. Coordinate with wall framing to align webs of bottom chords and load-bearing studs or continuously reinforce track to transfer loads to structure.
2. Install continuous bridging and permanently brace trusses as indicated on Shop Drawings and designed according to CFSEI's Technical Note 551e, "Design Guide: Permanent Bracing of Cold-Formed Steel Trusses."

B. Install cold-formed steel trusses and accessories true to line and location, and with connections securely fastened.

C. Install temporary bracing and supports to secure trusses and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to trusses are secured.

D. Truss Spacing: As indicated on Drawings.

3.3 ERECTION TOLERANCES

A. Install cold-formed steel trusses level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Space individual trusses no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform inspections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Cold-formed metal trusses will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel trusses with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

END OF SECTION 054400

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SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Stainless Steel Corner Guards.
2. Metal bollards.
3. Miscellaneous angles, tubes, and steel shapes as required for the work to be furnished and installed (i.e. glue-laminated timber, counters, benches, etc.)

B. Related Sections:

1. Division 3 Section "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts and other items cast into concrete.
2. Division 5 Section "Structural Steel".

1.3 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

2. Plan showing corner guard locations and heights.

B. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer, registered in the State of Florida, responsible for their preparation.

C. Prime Paint and Galvanizing Coating Product Data.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified professional engineer, registered in the State of Florida.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.7 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes. All fabrications shall be prime painted with zinc rich primer. Fabrications that are not fully concealed shall be painted in accordance with Division 9 “Interior Painting.”

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Tubing: ASTM A 500, cold-formed steel tubing.

2.3 NONFERROUS METALS

A. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.

B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

C. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.4 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for interior use at stainless steel applications. Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless-steel fasteners for fastening aluminum.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3; with hex nuts, ASTM A 563, Grade C3; and, where indicated, flat washers.

D. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1.

E. Eyebolts: ASTM A 489.

F. Machine Screws: ASME B18.6.3.

G. Lag Screws: ASME B18.2.1.

H. Plain Washers: Round, ASME B18.22.1.

I. Lock Washers: Helical, spring type, ASME B18.21.1.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

D. Concrete: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 4000 psi.

2.6 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections and Drawings as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

C. Prime miscellaneous interior framing and supports with zinc-rich primer unless otherwise specified in Division 9 Section “Interior Painting.” Galvanize fabrications for

exterior use with G90 coating.

2.8 METAL BOLLARDS

A. Fabricate metal bollards from 1/4-inch wall-thickness round steel tubing.
   1. Bollards to be concrete filled will be fabricated with holes for concrete fill application and galvanizing and provided with a vinyl sleeve cover to match existing.

B. Hot-dip galvanize after fabrication.

C. Plastic Cover: Polyethylene Thermoplastic (HDPE) tubes having ultra-violet resistance and antistatic properties, normal thickness 0.250 inches. Color shall be OHSA yellow unless otherwise noted. Size covers for pipe diameters.

2.9 STAINLESS STEEL CORNER GUARDS

A. Stainless steel corner guards Type 304, 16 gauge, 2” x 2”, with vertical grain-brushed finished – No. 4 – full wall height unless noted otherwise.

B. Factory applied two sided tape or field applied construction adhesive.

2.10 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products at all exterior locations.

   1. G90 coating.

   2. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

   3. Touch-up galvanized coating after field welding is completed.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

   1. Shop prime with unless zinc-rich primer is indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment,

and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, epoxy set anchors, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 INSTALLING METAL BOLLARDS

A. Fill metal-capped bollards solidly with concrete where noted on the Drawings and allow concrete to cure seven days before installing.

B. Anchor bollards in concrete. Fill annular space around bollard solidly with nonshrink, nonmetallic grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch toward bollard.

C. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

3.4 INSTALLING CORNER GUARDS

A. Examination:
1. Examine areas and conditions in which the corner guard systems will be installed.
2. Complete all finishing operations, including painting, before beginning installation of corner guards.
3. Wall surface shall be dry and free from dirt, grease and loose particles.

B. Preparation:

1. General: Prior to installation, clean substrate to remove dust, debris and loose particles.

C. Installation:
1. General: Locate the Corner Guard as indicated on the Architect accepted shop drawing for the appropriate substrate and install corner guard level and plumb as the indicated on the shop drawings.
2. Installation of Stainless Steel Corner Guards

a. Surface must be dry, clean and property sealed.
b. Two-sided tape: Peel paper from the factory applied tape and apply pressure until a light fit is achieved, or; Cement on: Apply a premium heavy-duty construction adhesive in a zigzag pattern over the back of each wing of the corner guard. Position corner guard on the wall and apply pressure until a tight fit is achieved.
c. Remove the protection plastic covering from the exposed surface of the corner guard.

D. Cleaning

1. At completion of the installation, clean surfaces with a natural based, non-abrasive cleaner. Ammonia and alcohol based cleaners may be used.

END OF SECTION 05500

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SECTION 06105 – MISCELLANEOUS CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Provisions and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Rough carpentry work not specified elsewhere and generally intended for support of other work.
2. Wood furring/blocking
3. Wood equipment bases.
4. Miscellaneous blocking, grounds, nailers, and panels.
5. Plywood panels.
6. Custom decorative polyurethane brackets

B. Particle Board and MDF is not acceptable as a substitute for plywood.

C. Related Sections include the following:

1. Division 6 Section “Interior Finish Carpentry”.

2. Division 7 Section “Sheet Metal Flashing and Trim” and Roof Accessories”

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.

4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
6. Florida product approval or engineered documents for exterior cladding and decorative elements.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Powder-actuated fasteners.
5. Expansion anchors.
6. Metal framing anchors.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

B. Quality Standard: Comply with AWI AWS for grades of architectural woodwork, construction, finishes, and other requirements. Provide AWI certification labels or AWI certificates of compliance indicating that woodwork meets requirements of grades specified.

Surface Burning Characteristics Provide materials with the following characteristics as determined by testing identical products per ASTM test method indicated below by Underwriters Laboratories, Inc. (UL), Intertek Testing Services (ITS), Hardwood Plywood and Veneer Association (HPVA), or another inspecting and testing agency acceptable to authorities having jurisdiction.

1. Surface burning characteristics shall not exceed values indicated or required by Local Codes and tested per ASTM E 84.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack material above ground level on uniformly spaced supports to prevent deformation.

B. For material pressure treated with waterborne chemicals, place spacers between each bundle for air circulation.

C. Remove or loosen plastic wrappings. Sticker individual panels to hasten acclimatization.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

A. Standards: Furnish lumber manufactured to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.

B. Grade Stamps: Furnish lumber with each piece factory-marked with grade stamp of inspection agency that indicates grading agency, grade, species, moisture content at time of surfacing, and mill.

1. Sizes: Provide nominal sizes indicated, complying with PS 20 except where actual sizes are specifically noted as being required.

C. Surfacing: Dressed lumber, S4S, unless otherwise indicated.

D. MDF or particle board is not acceptable.

2.2 DIMENSION LUMBER FOR CONCEALED CONDITIONS

A. Species: Any wood species listed by PS 20.

B. Moisture Content: S-DRY, KD 19 or MC 19 (19 percent maximum moisture content).

C. Grade: No. 2 or standard grade.

2.3 DIMENSION LUMBER FOR EXPOSED CONDITIONS

A. Species: Any wood species listed by PS 20.

B. Moisture Content: S-DRY, KD 19 or MC 19 (19 percent maximum moisture content).

C. Grade: No. 2 or standard grade.

2.4 BOARDS FOR CONCEALED CONDITIONS

A. Species: Any wood species listed by PS 20.

B. Moisture Content: S-DRY, KD 19 or MC 19 (19 percent maximum moisture content).

C. Grade: No. 2, 2 Common, or Construction Boards.

2.5 BOARDS FOR EXPOSED CONDITIONS

A. Species: Any wood species listed by PS 20.

B. Moisture Content: S-DRY, KD 19 or MC 19 (19 percent maximum moisture content).

C. Grade: No. 2, 2 Common, Construction Common, or Construction Boards.

2.6 BOARDS FOR WET CONDITIONS

A. Boards for wet conditions, such as base cabinets with sinks or subject to wetting shall be constructed of Marine Grade Plywood.

B. Species: Douglas fir or Western Larch

C. Moisture Content: S-Dry, KD 19 or MC 19 (19 percent maximum moisture content).

D. Grade: All plies of veneer shall be B or better – (B-B Marine Grade).

E. The exposure durability rating is “Exterior” and the glue used shall be fully waterproof structural adhesive.

2.7 CONSTRUCTION PANELS

A. Standards: Comply with requirements of PS 1 Voluntary Product Standard "Construction and Industrial Plywood" for veneer plywood and APA PRP-108 "Performance Standards and Policies for Structural-Use Panels" for performance-rated panels.

1. Trademark: Furnish construction panels that are each factory-marked with APA trademark for grade specified.

B. Miscellaneous Exposed Plywood: DOC PS 1, A-D Interior, thickness as indicated but not less than ½-inch.

C. Miscellaneous Concealed Plywood: C-C Plugged Exterior, thickness as indicated but not less than ½-inch nominal.

D. Electrical/Telephone Backing Panels: C-D Plugged, Exposure 1 plywood panels, fire-retardant treated, thickness as indicated but not less than ¾” inch nominal. (4’-0” X 8’-0”)

2.8 FASTENERS

A. General: Where miscellaneous carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of AISI Type 304 stainless steel.

B. Nails, Wire, Brads and Staples: FS FF-N-105.

C. Bolts: ASTM A 307, Grade A; with ASTM A 563 hex nuts and flat washers.

D. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

2.9 PRESERVATIVE WOOD TREATMENT BY PRESSURE PROCESS

A. General: Obtain preservative-treated lumber complying with AWPA Standard C2. Mark each treated item with AWPB or SPIB Quality Mark Requirements. Coat surfaces cut after treatment to comply with AWPA M4.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Above-Ground Wood Treatment: Pressure treat with waterborne preservatives to a minimum retention of 0.25 pcf.

1. Kiln-dry interior dimension lumber after treatment to 19 percent maximum moisture content.
2. Treat wood items indicated and in the following circumstances:

a. In contact with roofing, flashing, or waterproofing.
b. In contact with masonry or concrete.
c. Within 18 inches of grade.

C. Ground-Contact Wood Treatment: Pressure treat with waterborne preservatives to a minimum retention of 0.40 pcf.

2.10 FIRE-RETARDANT TREATMENT BY PRESSURE PROCESS

A. General: Identify treated wood with appropriate classification marking of Underwriters Laboratories Inc. or other testing and inspection agency acceptable to authorities having jurisdiction.

B. Dimension Lumber: Comply with AWPA C20.

1. Treatment Types: Interior Type A for protected wood and Exterior Type for wood exposed to weather.

C. Plywood: Comply with AWPA C27.

1. Treatment Types: Interior Type A for protected wood and Exterior Type for wood exposed to weather.

D. Inspect each piece after drying and discard damaged or defective pieces.

2.11 DECORATIVE POLYURETHANE BRACKETS

A. Custom decorative brackets based on the profile as detailed on the drawings, as manufactured by Fypon Inc., or Architect approved equal. Products to be UV resistant polyurethane.

B. Finish to be white.

PART 3 - PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Condition work to average prevailing humidity conditions in installation areas before installing. Before installing work, examine shop-fabricated work for the completion and complete work as required.

3.3 INSTALLATION, GENERAL

A. Discard units of material with defects that impair quality of miscellaneous carpentry and in sizes that would require an excessive number or poor arrangement of joints.

B. Cut and fit miscellaneous carpentry accurately. Install members plumb and true to line and level.

C. Coat cut edges of preservative-treated wood to comply with AWPA M4.

D. Securely fasten miscellaneous carpentry as indicated and according to applicable Florida building codes and recognized standards.

E. Countersink nail heads on exposed carpentry work and fill holes.

F. Use fasteners of appropriate type and length. Predrill members when necessary to avoid splitting wood.

G. Quality Standard: Install architectural woodwork to comply with AWI AWS for the same grades specified in Part 2 – Products of this Section for type of architectural woodwork involved.

H. Fire Retardant - Treated Wood: Handle, store, and install fire retardant – treated wood to comply with recommendations of chemical treatment, manufacturer, including, but not limited to, those for adhesives used to install architectural woodwork.

I. Installation Tolerances: Install architectural woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims.

3.4 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

A. Install where shown and where required for screeding or attachment of other work. Cut and shape to required size. Coordinate location with other work involved.

B. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated.

3.5 WOOD FURRING

A. General: Install at spacing indicated, with closure strips at edges and openings. Shim with wood as required for tolerance of finished work.

3.6 CONSTRUCTION PANELS

A. Comply with applicable installation recommendations in APA Form E30 "Design/Construction Guide--Residential & Commercial."

B. Install Electrical/Telephone Backing Panels as required to accommodate equipment.
   1. Obtain Fire Marshall approval and acceptance of fire-rated panels prior to painting surfaces.

3.7 ADJUSTING AND CLEANING

A. Repair damaged and defective work where possible to eliminate functional and visual defects. Where not possible to repair, replace the work.

B. Clean architectural woodwork on exposed and semi-exposed surfaces. Touch-up shop-applied finishes to restore damaged or soiled areas.

3.8 PROTECTION

A. Provide final protection and maintain conditions in a manner acceptable to the installer, that shall ensure that the work shall be without damage at time of Substantial Completion.

END OF SECTION 06105

SECTION 061800 - GLUED-LAMINATED CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes framing using structural glued-laminated timber.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for dimension lumber items associated with structural glued-laminated timber.

1.3 DEFINITIONS

A. Structural Glued-Laminated (Glulam) Timber: An engineered, stress-rated timber product assembled from selected and prepared wood laminations bonded together with adhesives and with the grain of the laminations approximately parallel longitudinally.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include data on lumber, adhesives, fabrication, and protection.
2. For preservative-treated wood products. Include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
3. For connectors. Include installation instructions.

B. Shop Drawings:

1. Show layout of structural glued-laminated timber system and full dimensions of each member.
2. Indicate species and laminating combination.
3. Include large-scale details of connections.

C. Samples: Full width and depth, 24 inches (600 mm) long, showing the range of variation to be expected in appearance of structural glued-laminated timber including variations due to specified treatment.

1. Apply specified factory finish to three sides of half length of each Sample.

D. Delegated-Design Submittal: For structural glued-laminated timber and timber connectors.

1.5 INFORMATIONAL SUBMITTALS

A. Certificates of Conformance: Issued by a qualified testing and inspecting agency indicating that structural glued-laminated timber complies with requirements in AITC A190.1.

B. Material Certificates: For preservative-treated wood products, from manufacturer. Indicate type of preservative used and net amount of preservative retained.

C. Research/Evaluation Reports: For structural glued-laminated timber and timber connectors, from ICC-ES.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: An AITC- or APA-EWS-licensed firm certified for chain of custody by an FSC-accredited certification body.

1.7 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with provisions in AITC 111.

B. Individually wrap members using plastic-coated paper covering with water-resistant seams.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section "Quality Requirements," to design structural glued-laminated timber and connectors.

B. Structural Performance: Structural glued-laminated timber and connectors shall withstand the effects of structural loads shown on Drawings without exceeding allowable design working stresses listed in AITC 117 or determined according to ASTM D 3737 and acceptable to authorities having jurisdiction.

C. Seismic Performance: Structural glued-laminated timber and connectors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7-10.

2.2 STRUCTURAL GLUED-LAMINATED TIMBER

A. General: Provide structural glued-laminated timber that complies with AITC A190.1 and AITC 117 or research/evaluation reports acceptable to authorities having jurisdiction.

1. Factory mark each piece of structural glued-laminated timber with AITC Quality Mark or APA-EWS trademark. Place mark on surfaces that are not exposed in the completed Work.
2. Provide structural glued-laminated timber made from single species.
3. Provide structural glued-laminated timber made from solid lumber laminations; do not use laminated veneer lumber.
4. Provide structural glued-laminated timber made with wet-use adhesive complying with AITC A190.1.

B. Species and Grades for Structural Glued-Laminated Timber: Southern pine that complies with structural properties indicated on the drawings.

C. Species and Grades for Beams and Purlins:

1. Species and Beam Stress Classification: Southern pine, 24F-1.8E
2. Lay-up: Balanced

D. Species and Grades for Columns and Truss Members:

1. Species and Combination Symbol: Southern pine, 50.

E. Appearance Grade: Architectural complying with AITC 110.

1. For Premium and Architectural appearance grades, fill voids as required by AITC 110.

2.3 PRESERVATIVE TREATMENT

A. Preservative Treatment: Where preservative-treated structural glued-laminated timber is indicated, comply with AWPA U1, Use Category 1 for interior framing, Category 3A for exterior canopy framing.

1. Use preservative solution without substances that might interfere with application of indicated finishes.
2. Do not incise structural glued-laminated timber or wood used to produce structural glued-laminated timber.

B. Preservative:

1. Oxine copper (copper-8-quinolinolate) in a light petroleum solvent.
2. Pentachlorophenol in light petroleum solvent.
3. Copper naphthenate in a light petroleum solvent.
4. Ammoniacal zinc copper arsenate (ACZA) in a water solution.
5. Chromated copper arsenate (CCA) in a water solution.
6. Ammoniacal copper quat Type A (ACQ-C) in a water solution.

7. Propiconazole tebuconazole imidacloprid (PTI) in a water emulsion.

C. After dressing members, apply a copper naphthenate field-treatment preservative to comply with AWPA M4 to surfaces cut to a depth of more than 1/16 inch (1.5 mm).

2.4 TIMBER CONNECTORS

A. Fabricate beam seats from steel as indicated on the drawings.

B. Fabricate beam hangers from steel as indicated on the drawings.

C. Fabricate hinge connectors from steel as indicated on the drawings.

D. Fabricate strap ties from steel as indicated on the drawings.

E. Fabricate tie rods from round steel bars with upset threads connected with forged-steel turnbuckles complying with ASTM A 668/A 668M.

F. Provide bolts, 3/4 inch (19 mm) unless otherwise indicated, complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); nuts complying with ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

G. Provide shear plates from steel as indicated on the drawings.

H. Materials: Unless otherwise indicated, fabricate from the following materials:

1. Structural-steel shapes, plates, and flat bars complying with ASTM A 36/A 36M.
2. Round steel bars complying with ASTM A 575, Grade M 1020.
3. Hot-rolled steel sheet complying with ASTM A 1011/A 1011M, Structural Steel, Type SS, Grade 33.

I. Finish steel assemblies and fasteners with rust-inhibitive primer, 2-mil (0.05-mm) dry film thickness.

J. Hot-dip galvanize steel assemblies and fasteners after fabrication to comply with ASTM A 123/A 123M or ASTM A 153/A 153M.

2.5 MISCELLANEOUS MATERIALS

A. End Sealer: Manufacturer's standard, transparent, colorless wood sealer that is effective in retarding the transmission of moisture at cross-grain cuts and is compatible with indicated finish.

B. Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer that is compatible with indicated finish.

2.6 FABRICATION

A. Shop fabricate for connections to greatest extent possible, including cutting to length and drilling bolt holes.

1. Dress exposed surfaces as needed to remove planing and surfacing marks.

B. Camber: Fabricate horizontal and inclined members of less than 1:1 slope with either circular or parabolic camber equal to 1/500 of span.

C. Where preservative-treated members are indicated, fabricate (cut, drill, surface, and sand) before treatment to greatest extent possible. Where fabrication must be done after treatment, apply a field-treatment preservative to comply with AWPA M4.

1. Use inorganic boron (SBX) treatment for members not in contact with the ground and continuously protected from liquid water.
2. Use copper naphthenate treatment for members in contact with the ground or not continuously protected from liquid water.

D. End-Cut Sealing: Immediately after end cutting each member to final length and after preservative treatment, apply a saturation coat of end sealer to ends and other cross-cut surfaces, keeping surfaces flood coated for not less than 10 minutes.

E. Seal Coat: After fabricating, sanding, and end-coat sealing, apply a heavy saturation coat of penetrating sealer on surfaces of each unit except for preservative-treated wood where treatment included a water repellent.

2.7 FACTORY FINISHING

A. Wiped Stain Finish: Manufacturer's standard, dry-appearance, penetrating acrylic stain and sealer; oven dried and resistant to mildew and fungus.

1. Color: As selected by Architect from manufacturer's full range.

B. Clear Finish: Manufacturer's standard, two-coat, clear varnish finish; resistant to mildew and fungus.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates in areas to receive structural glued-laminated timber, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Erect structural glued-laminated timber true and plumb and with uniform, close-fitting joints. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.

1. Handle and temporarily support glued-laminated timber to prevent surface damage, compression, and other effects that might interfere with indicated finish.

B. Framing Built into Masonry: Provide 1/2-inch (13-mm) clearance at tops, sides, and ends of members built into masonry; bevel cut ends 3 inches (76 mm); and do not embed more than 4 inches (102 mm) unless otherwise indicated.

C. Cutting: Avoid extra cutting after fabrication. Where field fitting is unavoidable, comply with requirements for shop fabrication.

D. Fit structural glued-laminated timber by cutting and restoring exposed surfaces to match specified surfacing and finishing.

1. Predrill for fasteners using timber connectors as templates.
2. Finish exposed surfaces to remove planing or surfacing marks and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.
3. Coat cross cuts with end sealer.
4. Where preservative-treated members must be cut during erection, apply a field-treatment preservative to comply with AWPA M4.

    a. Use inorganic boron (SBX) treatment for members not in contact with the ground and continuously protected from liquid water.
    b. Use copper naphthenate treatment for members in contact with the ground or not continuously protected from liquid water.

E. Install timber connectors as indicated.

1. Unless otherwise indicated, install bolts with same orientation within each connection and in similar connections.
2. Install bolts with orientation as indicated or, if not indicated, as directed by Architect.

3.3 ADJUSTING

A. Repair damaged surfaces and finishes after completing erection. Replace damaged structural glued-laminated timber if repairs are not approved by Architect.

3.4 PROTECTION

A. Do not remove wrappings on individually wrapped members until they no longer serve a useful purpose, including protection from weather, sunlight, soiling, and damage from work of other trades.

1. Coordinate wrapping removal with finishing work. Retain wrapping where it can serve as a painting shield.
2. Slit underside of wrapping to prevent accumulation of moisture inside the wrapping.

END OF SECTION 061800

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SECTION 06202 – INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Provisions and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Interior running trim and wood veneer.

B. Related Sections include the following:

1. Division 6 Section "Miscellaneous Carpentry" for furring, blocking, and other carpentry work not specified in this Section.

C. Products furnished, but not installed, under this Section include the products listed below. Coordinating and scheduling the purchase and delivery of these products remain requirements of this Section.

1.3 DEFINITIONS

A. MDF: Medium-density fiberboard. (Shall not be used)

B. MDO Plywood: Plywood with a medium-density overlay on the face.

1.4 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect materials against weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation within and around stacks and under temporary coverings.

B. Deliver interior finish carpentry materials only when environmental conditions meet requirements specified for installation areas. If interior finish carpentry materials must

be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and applicable grading rules of inspection agencies certified by ALSC's Board of Review.

1. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
2. For exposed lumber, mark grade stamp on end or back of each piece.

B. Softwood Plywood: DOC PS 1.

C. Hardboard: AHA A135.4.

D. Marine Plywood: BS 1088, Medium Density Overlay.

E. Stain: Match Architect’s sample; the wood trim shall match the wood veneer door stain.

F. Mill unfinished aluminum: ¼ inch ga.

2.2 INTERIOR TRIM AND WOOD VENEER

A. Hardwood Moldings and veneer for Transparent Finish (Stain or Clear Finish): WMMPA HWM 2, N-grade wood moldings made to patterns included in WMMPA HWM 1. Transparent finish where scheduled or shown on the drawings match Architects sample for stain color or color selected by the Architect based on manufacturer’s full range of colors.

1. Species: White Oak to match stained doors.
2. Maximum Moisture Content: 9 percent.
3. Finger Jointing: Not allowed.
4. Matching: Selected for compatible grain and color.

B. Moldings for Opaque Finish (Painted Finish): Made to patterns included in WMMPA WM 12.

1. Hardwood Moldings: WMMPA HWM 2, P-grade.

a. Species: Yellow poplar; MDF not allowed.
b. Maximum Moisture Content: 9 percent.

2. Finger Jointing: Allowed.

2.3 MISCELLANEOUS MATERIALS

A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

1. Where galvanized finish is indicated, provide fasteners and anchorages with hot-dip galvanized coating complying with ASTM A 153/A 153M.

B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.

C. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.

2.4 FABRICATION

A. Back out or kerf backs of the following members except those with ends exposed in finished work:

1. Interior standing and running trim.

B. Ease edges of lumber to 1/16-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.

1. Do not use manufactured units with defective surfaces, sizes, or patterns.

B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Countersink fasteners, fill surface flush, and sand where face fastening is unavoidable. Where wood is scheduled to be stained or wood grain exposed, wood filler shall match wood species and shall be stainable. Fasteners shall be concealed and spaced regularly in consistent pattern @ stained wood components.
3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation.
4. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.

1. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints & fastener nail hole filler.
2. Install trim after gypsum-board joint finishing operations are completed.

3. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 ADJUSTING

A. Replace interior finish carpentry that is damaged or does not comply with requirements. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.6 CLEANING

A. Clean interior finish carpentry on exposed and semi exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

3.7 PROTECTION

A. Protect installed products from damage from weather and other causes during remainder of the construction period.

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 06202

SECTION 06402 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Plastic-laminate cabinets.
2. Solid-surfacing-material countertops and splashes and millwork.
3. Cabinet accessories.

B. Related Sections include the following:

1. Division 5 Section “Metal Fabrications”.
2. Division 6 Section "Miscellaneous Carpentry" for wood blocking required for installing woodwork and concealed within other construction before woodwork installation.
3. Division 6 Section "Interior Finish Carpentry" for interior carpentry exposed to view that is not specified in this Section.
4. Division 6 Section “Fire Retardant Treatment (Fire Retardant Treated Wood)” for fire retardant treatment for wood products.
5. Division 7 Section “Joint Sealants” for sealant schedule.
6. Division 9 Section "Interior Painting” for field applied finishes and stains.
7. Division 10 Section “Toilet Compartments” for toilet partitions and screens.

1.3 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, including cabinet hardware and accessories and finishing materials and processes.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show details full size.
2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers and other items installed in architectural woodwork.
4. Show locations of vents for computer equipment and grommets for cable wiring for power, data, and telephone equipment connections.

C. Samples for Initial Selection:

1. Shop-applied opaque finishes.
2. Plastic laminates.
3. PVC edge material.
4. Solid surface samples.
5. Cabinet Hardware samples when requested by the Architect.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and fabricator.

B. Product Certificates: For each type of product, signed by product manufacturer.

C. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.

B. Installer Qualifications: Certified participant in AWI's Quality Certification Program.

C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers.

D. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1. Provide AWI Quality Certification Program certificates indicating that woodwork, including installation, complies with requirements of grades specified.
2. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with such selections and requirements in addition to the quality standard.

E. Pre-installation Conference: Conduct conference at Project site to comply with

requirements in Division 1 Section "Project Management and Coordination."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.
2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.9 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

B. Coordinate sizes of computer equipment, or other equipment provided by the Owner, that is integral to the cabinetry work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Certified Wood: Interior architectural woodwork shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

C. Wood Products: Comply with the following:

1. Hardboard: AHA A135.4.
2. Softwood Plywood: DOC PS 1, Medium Density Overlay.
3. Marine Plywood: BS 1088, Medium Density Overlay.
4. NO PARTICLEBOARD MDF, OR FIBERBOARD SHALL BE USED.

D. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

1. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:

a. Abet Laminati, Inc.
b. Arborite; Division of ITW Canada, Inc.
c. Lamin-Art, Inc.
d. Wilsonart.
e. Nevamar Company, LLC; Decorative Products Div.

2. Color: As scheduled on the Drawings or specified to match millwork to be selected from manufacturer's full range of colors. Refer to article "Solid-surfacing Material Countertops and Integral Sinks" this section for additional information.

E. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2. "Caesarstone Quartz" or Architect and Owner approved substitution the color and properties of any proposed substitution shall be an exact match to the materials specified or scheduled, subject to the approval of the Owner.

2.2 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8 Section "Door Hardware (Scheduled by Describing Products)." Basis of Design: Hafele or Architect approved equal.

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening.

C. Wire Pulls: Back mounted, solid metal, 5 inches long, 2-1/2 inches deep, and 5/16 inch in diameter. Steel, matte nickel finish.

D. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; recessed; with shelf rests, B04081. Flush with cabinet interior face. Groove plug for wood shelves ¾" thick at book cases and ½" thick at interior cabinets.

E. Rakks Angle Counter Support Bracket EH-1818-P: Primed finish. Painted to match

wall color.

F. Drawer Slides: BHMA A156.9, B05091.

1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.

G. Grommets for Cable Passage through Countertops: 2-inch OD, black, molded-plastic grommets and matching plastic caps with slot for wire passage.

1. Product: Subject to compliance with requirements, provide "SG series" by Doug Mockett & Company, Inc. or polished edge of the through color solid surface material where approved by the Architect.

H. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base or as selected by Architect from manufacturer’s standard available finishes.

I. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

J. Kitchen/ Break Area: Under Counter Pull out Trash Cans: Concealed pull-out trash bin, heavy duty side wall mounted guides, (1) one 36 quart gray bin. Hafele –503.88.990 , or Architect approved equal.

K. Restroom Trash Bin: The pull out trash bin shall be supported and enclosed within a custom heavy gauge 316 stainless steel clad-plywood enclosure, under the counter and overhead supported by the counter top, with clear floor space below the cabinet enclosure and lockable continuous hinged stainless steel door lock shall be keyed to building standard. Refer to the drawings for profile, dimension & size of stainless steel trash bin.

2.3 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content. All concealed blocking shall be fire retardant.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

C. Adhesives, General: Adhesives shall not contain urea formaldehyde.

D. VOC Limits for Installation Adhesives: Installation adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D

(EPA Method 24):

1. Wood Glues: 30 g/L.
2. Multipurpose Construction Adhesives: 70 g/L.
3. Contact Adhesive: 250 g/L.

E. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.

1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.4 FABRICATION, GENERAL

A. Interior Woodwork Grade: Unless otherwise indicated, provide Custom -grade interior woodwork complying with referenced quality standard.

B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch.

D. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

E. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of openings in countertops with a coat of varnish.

2.5 PLASTIC-LAMINATE CABINETS

A. Grade: Custom.

B. AWI Type of Cabinet Construction: Reveal overlay Reveal overlay on face frame.

C. Reveal Dimension: 1/2 inch.

D. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:

1. Horizontal Surfaces Other Than Tops: Grade HGS.
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade HGS.
4. Edges: PVC edge banding, 012 inch thick, matching laminate in color, pattern, and finish.

E. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.

    a. Edges of Plastic-Laminate Shelves: PVC edge banding, 012 inch thick, matching laminate in color, pattern, and finish.
    b. For semi exposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS.

2. Drawer Sides and Backs: Plywood backed decorative panels or wood clear finish as selected by Architect.
3. Drawer Bottoms: Plywood backed decorative panels or wood clear finish as selected by Architect.

F. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.

G. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. Match existing millwork as approved by Architect and Owner from laminate manufacturer's full range in the following categories:

    a. Solid colors, matte finish.
    b. Solid colors with core same color as surface, matte finish.
    c. Wood grains, matte finish.
    d. Patterns, matte finish.

H. Provide dust panels of 1/4-inch plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

I. Use marine grade plywood with plastic laminate veneer for all counter tops, cabinet bases and cabinet boxes with sinks.

2.6 SOLID-SURFACING WINDOW SILLS AND RESTROOM COUNTER TOPS

A. Grade: Premium.

B. Solid-Surfacing-Material Thickness: 1/2 inch or 3/4 inch or composite thickness to achieve profiles shown on drawings. Thickness shall be built up to 1 ½" @ counter edges, top openings, and sink rims.

C. Bullnose edge: Manufacturer's standard composite bull nose edge at counter tops and window sills, 1 ½" total thickness at counter top edge and window sills; edge openings at sinks to be flush with sink and edge openings at trash chute to be 1/8" radius eased edge.

D. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid-surfacing material complying with the following requirements:

1. Basis-of-Design shall be "Caesarstone" Quartz, color for restrooms countertop shall be "6600 Nougat" color for window sill is "5000 London Grey". Multiple color selections per Architect's and Owner's selection.

2. Integral Sinks – Elkay "Quartz Classic".

E. Fabricate tops in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, silicone, sealers, fabrication, and finishing.

1. Fabricate tops with shop-applied edges of materials and configuration indicated or specified.
2. Fabricate tops with loose backsplashes for field application, at back and sides of counter tops unless noted otherwise and integral sills are scheduled or required.
3. All supporting substrates will be fully concealed, cut outs in counter tops shall be trimmed in solid surface material where cutouts are indicated on the drawings.
4. Coordinate and pre drill holes for plumbing fixtures and scheduled accessories.
5. Field verify dimensions of the countertops & template before fabrication.

F. Install integral sink bowls in countertops in shop.

G. Drill holes in countertops for plumbing fittings and soap dispensers in shop. Polish all edges.

H. Refer to Section "Joint Sealants" – Sealants for mildew resistant silicone sealant to be used at counter tops.

2.7 SHOP FINISHING

A. Grade: Provide finishes of same grades as items to be finished.

B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

C. General: Shop finish transparent-finished interior architectural woodwork at fabrication shop as specified in this Section. Refer to Division 9 painting Sections for finishing opaque-finished architectural woodwork.

D. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.

1. Back priming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require back priming when surfaced with plastic laminate, backing paper, or thermoset decorative panels.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.

C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
2. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
3. Secure backsplashes to walls with adhesive.
4. Caulk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."

H. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semi exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06402

SECTION 06703 – FIRE RETARDANT TREATMENT (FIRE RETARDANT TREATED WOOD)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes fire retardant treatment for wood, including framing, decking, sheathing and other wood construction, not exposed to weather.

B. Related Sections include the following:

1. Division 6 Section “Miscellaneous Carpentry” for wood blocking and plywood construction panels.
2. Division 6 Section “Interior Finish Carpentry.”

1.3 REFERENCES

A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title, or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation. Most recent editions should be used.

B. American Society for Testing and Materials (ASTM):

1. ASTM D 5516 Standard Test Method for Evaluating the Flexural Properties of Fire Retardant Treated Softwood Plywood Exposed to Elevated Temperatures.
2. ASTM D 5664 Standard Test Method for Evaluating the Effects of Fire-Retardant Treatments and Elevated Temperatures on Strength Properties of Fire-Retardant Treated Lumber.
3. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.

C. American Wood Protection Association (AWPA):

1. AWPA Standard P25 Standard for Waterborne Preservatives.
2. AWPA Standard P49 Fire Retardant Formulations.
3. AWPA Standard U1, Use Category System.

D. Military Specification (Mil. Spec.):

1. Mil. Spec. L-19140E Lumber and Plywood, Fire-Retardant Treated.

E. National Fire Protection Association (NFPA):

1. NFPA 255 Standard Test Method for Surface Burning Characteristics of Building Materials.

F. Underwriters Laboratories, Inc. (UL):

1. UL 723 Test for Surface Burning Characteristics of Building Materials.
2. UL Building Materials Directory.

1.4 SYSTEM DESCRIPTION

A. Performance Requirements: Provide fire retardant treatment which will perform in accordance with manufacturer's stated performance criteria without defects, damage or failure.

1.5 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Section "Submittals Procedures."

B. Product Data: Submit product data, including manufacturer's product sheet, for specified products.

C. Quality Assurance Submittals: Submit the following:

1. Test Report: Certified test report showing compliance with specified performance characteristics and physical properties. Include in test report certification that fire retardant solution does not contain ammonium phosphate.

a. Evaluation Report: National Evaluation Report ESR-1626 indicating flamespread, strength, corrosion and hygroscopic properties.

2. Certificate: Certification from treatment plant certifying wood treatment applied complies with Dricon fire retardant treatment by Arch Wood Protection.

D. Closeout Submittals: Submit the following:

1. Warranty: Warranty documents specified herein.

1.6 QUALITY ASSURANCE

A. Wood Treatment Plant Qualifications: Wood treatment plant experienced in performing work of this section which has specialized in the treatment of wood similar to that required for this project and a plant licensed by Arch Wood Protection.

1. Certificate: When requested, submit certificate indicating qualification.

B. Regulatory Requirements: Provide fire retardant treatment which complies with the following regulatory requirements:

1.7 DELIVERY, STORAGE AND HANDLING

A. General: Comply with Division 1 Section “Product Requirements.”

B. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

1.8 WARRANTY

A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

B. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty document executed by authorized company official. Manufacturer’s warranty is in addition to, and not a limitation of, other rights Owner may have under the Contract Documents.

PART 2 - PRODUCTS

2.1 FIRE RETARDANT TREATMENT

A. Manufacturer: Arch Wood Protection. (Lonza)

1. Contact: 5660 New Northside Dr. NW, Suite 1100
Atlanta, GA 30328
Telephone: (678) 627-2000

B. Product Treatment: Dricon fire retardant treatment for wood is produced by licensed treatment plant. Fire retardant chemical shall provide protection against termites and fungal decay, shall be registered for use as a wood preservative by the U.S. Environmental Protection Agency (EPA), shall comply with formulation FR-1 of the current edition of AWPA Standard P49, and shall be free of halogens, sulfates and ammonium phosphate. Treated wood shall have a flamespread of less than 25 when tested in an extended 30-minute tunnel test in accordance with ASTM E 84, NFPA 255 or UL 723.

1. Corrosion Properties: Fire retardant treated wood in contact with carbon steel, galvanized steel, aluminum, copper and red brass shall exhibit corrosion rates less than 1 mil (0.025 mm) per year when tested in accordance with Fed. Spec. MIL-L-19140, Paragraph 4.6.5.2.

2. Testing: Testing on fire performance, strength and corrosion properties of fire retardant treated wood shall be recognized by issuance of a National Evaluation Services Report.

C. Fire Retardant Treatment: Manufacturer’s solution for fire retardant treatment of wood.

1. Treatment Standard: Comply with AWPA Standard U1.

2.2 PRODUCT SUBSTITUTIONS

A. Substitutions: Substitutions permitted in accordance with Division 01 provisions, Section 01600 - Materials and Equipment.

2.3 RELATED WOOD MATERIALS

A. General: Refer to Division 6 Sections for related wood materials specified herein.

2.4 SOURCE QUALITY

A. Source Quality: Obtain fire retardant treatment from a single manufacturer.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including product technical bulletins, for fire retardant treatment installation.

3.2 APPLICATION

A. Fire Retardant Treatment: Apply a fire retardant treatment in accordance with requirements of applicable codes and manufacturer's requirements.

3.3 PROTECTION

A. Protection: Protect fire retardant treated wood from damage during construction.

END OF SECTION 06703

SECTION 07115 – BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes cold-applied, emulsified-asphalt dampproofing applied to the following surfaces:

1. Interior face of concealed masonry exterior walls and as indicated on the Drawings or scheduled.

2. Hollow metal frame bucks, concealed side of door frame.

B. Related Sections include the following:

1. Division 8 Section “Metal Doors and Frames

2. Division 9 Section “Painting”

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include recommendations for method of application, primer, number of coats, coverage or thickness, and protection course.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain primary dampproofing materials and primers through one source from a single manufacturer. Provide secondary materials recommended by manufacturer of primary materials.

1.5 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit asphalt dampproofing to be performed according to manufacturers' written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cold-Applied, Emulsified-Asphalt Dampproofing:

a. ChemMasters Corp.
b. DeGusse Building Systems, Sonneborne brand products.
c. Gardener Gibson, Inc.
d. Henry Company.
e. Karnak Corporation.
f. Koppers Industries, Inc.
g. Malarkey Roofing Company.
h. Meadows, W. R., Inc.
i. Tamms Industries.

2.2 BITUMINOUS DAMPPROOFING

A. Cold-Applied, Emulsified-Asphalt Dampproofing:

1. Trowel Coats: ASTM D 1227, Type II, Class 1.
2. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.
3. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.
4. Product shall be acceptable for use within interior space applications.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Applicator present, for compliance with requirements for surface smoothness and other conditions affecting performance of work.

1. Begin dampproofing application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protection of Other Work: Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.

B. Clean substrates of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.

3.3 APPLICATION, GENERAL

A. Comply with manufacturer's written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of dampproofing.

1. Apply additional coats if recommended by manufacturer or required to achieve coverages indicated.
2. Allow each coat of dampproofing to cure 24 hours before applying subsequent coats.

B. Apply dampproofing to provide continuous plane of protection on exterior face of exterior masonry walls.

3.4 CLEANING

A. Remove dampproofing materials from surfaces not intended to receive dampproofing.

END OF SECTION 07115

SECTION 07120 – MEMBRANE WATERPROOFING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 GENERAL

A. Furnish all labor, materials, tools, equipment, etc., and services necessary and incidental to the complete fabrication, furnishing and erection of this Section as shown, noted, detailed, necessary and reasonably implied on the drawings and in the specifications.

1.3 SUBMITTALS

A. Submit manufacturer's detailed drawings and product data under provisions of Division 1 Section “Submittal Procedures.”

B. Submit manufacturer's printed literature indicating specifications, installation, instructions and general recommendations for waterproofing.

C. Include manufacturer's warranty, certification, or other data substantiating that the materials comply with the requirements, and are recommended by the manufacturer for the application shown or specified.

D. Submit certifications according to Article 1.4 – Quality Assurance.

1.4 QUALITY ASSURANCE

A. The manufacturer of waterproof materials shall have been regularly engaged in production of these materials for a minimum of 10 years and shall have 3 similar installations with a minimum of 5 years service at each installation.

B. The applying contractor shall be an approved applicator by the manufacturer.

C. The applying contractor must request the services of an approved representative of the manufacturer for the initial instructions in preparation, mixing and application of materials. Notification shall be in writing and allow 5 days for manufacturer to comply.

1.5 JOB-SITE MEETING

A. Job-site meeting of General Contractor, Applicator, Architect and approved manufacturer's representative shall be held before any work begins, to verify all surfaces and conditions to receive membrane. All approved submittals, drawings and specifications shall be examined and coordinated with job conditions.

1.6 DELIVERY AND STORAGE

A. Deliver materials in original sealed containers, clearly marked with manufacturer's name, brand name, and type of material.

B. Store materials per manufacturer's instructions.

1.7 WARRANTY

A. Warranty waterproofing work against defects in material and workmanship, leaks or any migration of water for a period of five (5) years from the date of substantial completion. Replace or make good such defects at no additional costs during warranty period including costs of correcting adjacent work affected in any way by replacing or correcting such defects.

PART 2- PRODUCTS

2.1 MATERIALS

A. Showers, etc., as listed in Article 3.1 – Installation, General, to receive membrane waterproofing, as manufactured by Laticrete International, Inc., as follows:

1. First ply shall be 9235 liquid applied waterproof membrane.

2. Reinforcing fabric shall be Laticrete brand rot-proof, hi-tensile cloth specifically treated for use with Laticrete waterproofing materials.

3. Second ply shall be 9235 liquid applied waterproof membrane.

B. Shower pan liners are specified in Division 15 Section, and shall be provided at the shower.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. All items in this Section shall be installed by experienced mechanics and in the best workmanlike standard of this trade and in strict accordance to the manufacturer's printed instructions and approved methods.

B. Membrane shall be installed in the following locations and where shown and/or indicated on the drawings:

1. All permanent shower floors, walls, soap and shampoo coves and tiled ceilings.

3.2 INSTALLATION

A. Prior to commencing of this work, the applicator shall examine the area to be covered and advise the Contractor and Architect of any existing conditions or surface contamination that will require correction before the work commences.

B. All floor drains and other penetrations shall be in place before the work commences.

C. All horizontal surfaces or surfaces to receive membrane shall be cleaned of all oil, grease, mortar and other foreign matter before the work commences. Membrane-mesh-reinforcing shall be installed at shower seats and horizontal surfaces.

D. Membrane shall be turned up walls a minimum of 6 inches at showers.

E. Corners and joints shall receive a double ply of the membrane and mesh reinforcing in accordance with manufacturer’s standard installation procedures.

F. Membrane-mesh-reinforcing shall not be required for vertical surfaces; install fluid applied membrane to vertical surfaces per the manufacture’s installation instructions.

3.3 TESTING

A. Completed sections of horizontal surface as agreed upon by Architect and manufacturer's representative shall be tested with a minimum of 1 inch of water for 48 hours.

B. All waterproof membranes shall be allowed to cure for a period of 3-5 days prior to flood testing. Manufacturer's representative shall have final decision on number of curing days.

C. After water test is approved, surface shall be allowed to dry before other work begins. Surfaces shall be protected as recommended by manufacturer, until finish materials are installed.

3.4 MATERIAL AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and be replaced with new material in the best workmanlike manner at no extra cost to the Owner.

END OF SECTION 07120

SECTION 07180 - TRAFFIC COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division / Specification Sections, apply to the Section.

1.2 SUMMARY

A. This Section includes traffic coatings for the following applications:

1. Hangar floors.

1.3 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Show extent of each traffic coating. Include details for treating substrate joints and cracks, and other termination conditions. Include layout of traffic striping and markings.

C. Samples: For each type of traffic coating required, prepared on rigid backing. Provide stepped samples on backing large enough to illustrate build-up of traffic coatings.

D. Material certificates and Installer certifications,

E. Maintenance data.

1.4 QUALITY ASSURANCE

A. Installer (Applicator) Qualifications: Applicator who is certified by manufacturer.

1. Certification: Written approval or license of applicator by traffic coating manufacturer.

B. Source Limitations: Use traffic coatings of a single manufacturer.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply traffic coatings to damp or wet substrates, when temperatures are below 40 deg F, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F above dew point.

1. Do not apply traffic coatings in snow, rain, fog, or mist, or when such weather conditions are imminent during the application and curing period. Apply only when frost-free conditions occur throughout the depth of the substrate.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace traffic coatings that fails in materials and workmanship within **five** years from date of Substantial Completion.

1. Warranty does not include deterioration or failure due to unusual weather phenomena, failure of prepared and treated substrate, formation of new substrate cracks exceeding 1/16 inch in width, fire, vandalism, or abuse by snowplow, maintenance equipment, and truck traffic.
2. Failure includes, but is not limited to, the following:

a. Adhesive or cohesive failures.
b. Abrasion or tearing failures.
c. Surface crazing or spalling.
d. Intrusion of water, oils, gasoline, grease, salt, deicer chemicals, or acids into substrate.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Material Compatibility: Provide primers; base, intermediate, and top coats; and miscellaneous materials that are compatible with one another and with substrate under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. VOC Content: Provide waterproofing and traffic paint materials that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Opaque waterproofing treatments: 400 g/L.
2. Pavement-Marking Paint: 150 g/L
3. Zone-Marking Coatings: 450 g/L.

2.2 TRAFFIC COATING

A. Basis-of-Design Product: The design for the vehicle bay floor coating is based on the product indicated below. Products by other listed manufacturers may be considered provided deviations from specifications of the product named are minor as judged by the Architect.

1. **Basis of Design: Dex-O-Tex Division /Crossfield Products Corp.- Aero-Flor III;**

2. Delta Polymers Inc.- Polythane 1005;

3. Dur-a-flex Inc.- Poly-thane #3

B. Primer: Manufacturer's standard factory-formulated primer recommended for substrate and conditions indicated.

C. Preparatory and Base Coats: Aliphatic Polyurethane coating

D. Top Coat: Aliphatic Polyurethane coating

1. Color and Gloss: As selected from manufacturer's full range of pigmented gloss and matte finishes.

E. Component Coat Thicknesses: As recommended by manufacturer for substrate and service conditions indicated, but not less than 13 mils dry film thickness (measured excluding aggregate):

F. Aggregate: Uniformly graded washed silica sand of particle sizes, shape, and minimum hardness recommended in writing by traffic coating manufacturer.

1. Spreading Rate: As recommended by manufacturer for substrate and service conditions indicated, but not less than the following:

a. Top Coat: As required to achieve slip-resistant finish.

2.3 MISCELLANEOUS MATERIALS

A. Joint Sealants: Multicomponent urethane sealant recommended in writing by manufacturer for substrate and joint conditions indicated and for compatibility with traffic coatings; complying with ASTM C 920.

PART 3 - EXECUTION

3.1 APPLICATION

A. General: Comply with manufacturer's written recommendations.

B. Verify compatibility with and suitability of substrates and that substrates are visibly dry and free of moisture.

1. Application of coating indicates acceptance of surfaces and conditions.

C. Concrete Substrates: Begin coating application only after minimum concrete curing and drying period recommended by traffic coating manufacturer has passed and after surfaces are dry.

1. Test for moisture by method recommended in writing by manufacturer.
2. Mechanically abrade concrete surfaces to a uniform profile according to ASTM D 4259. Do not acid etch.

D. Clean and prepare substrates to produce clean, dust-free, dry substrate for traffic coating application.

E. Mask adjoining surfaces not receiving traffic coatings including floor drains, hangar door rails and other substrate penetrations to prevent spillage, leaking, and migration of coatings.

F. Prepare, treat, rout, and fill joints and cracks substrates. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D 4258.

G. Start traffic coating application in presence of manufacturer's technical representative.

1. Verify that wet film thickness of each component coat complies with requirements every 100 sq. ft.
2. Prevent contamination and damage during application and curing stages.

END OF SECTION 07180

SECTION 07190 – WATER REPELLENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes clear water-repellent coatings for the following horizontal surfaces:

1. Exterior concrete and concrete walkways, or where noted on the Drawings.

1.3 RELATED SECTIONS

A. Coordinate work of this Section with work of other Sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other Sections, including:

1. Section 03300 – Cast-In-Place Concrete.
2. Section 03481 – Precast Concrete Bollards

1.4 REFERENCES

A. ACI 308: Standard Specification for Curing Concrete.

1.5 SUBMITTALS

A. Product Data: For each product indicated.

B. Product test reports.

C. Manufacturer’s compatibility certification with other sealants and finishes specified.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer (applicator) who employs only persons trained and approved by manufacturer to apply manufacturer’s products.

B. Apply a test sample, 4 feet by 4 feet in area, at designated location for approval prior to initiation of work, and examine concrete surfaces to establish standard of acceptable surface to be sealed.

C. Pre-Installation Meetings: Conduct meeting at Project site.

1. Schedule and convene meeting a minimum of 2 weeks, prior to commencing Work of this Section.
2. Review requirements for application, including surface preparation specified under other Sections, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details, installation procedures, testing and inspection procedures, protection, and repair.
3. Discuss procedures for protecting adjacent finished Work.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard for in which Installer agrees to repair or replace water-repellent coatings that fail in materials and workmanship within ten (10) years from date of Substantial Completion. Warranty does not include deterioration or failure of coating due to unusual weather phenomena, failure of prepared and treated substrate, formation of new joints and cracks in excess of 1/16 inch in width, fire, vandalism, or abuse by maintenance equipment.

1.8 DELIVERY, STORAGE AND HANDLING

A. Comply with Section 01600 – Materials and Equipment.

B. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

C. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Store tightly sealed materials off ground and away from moisture, direct sunlight, extreme heat, and freezing temperatures.

E. Store in unopened packaging in clean, dry environmental protected from sunlight at 40 degrees F (4 degrees C) to 85 degrees F (29 degrees C) prevent material from freezing.

1.9 PROJECT CONDITIONS

A. Environmental Requirements:

1. Ensure that substrate surface and ambient air temperature are minimum of 35 degrees F (minus 7 degrees C) and rising at application time and remain above 35 degrees F (minus 7 degrees C) for at least 24 hours after application. Ensure that frost or frozen surfaces are thawed and dry.
2. Do not place surface hardener in areas without roof cover.
3. Allow surfaces to attain temperature and conditions specified before proceeding with surface hardener application.
4. Perform Work of this Section in well-ventilated areas.

PART 2 - PRODUCTS

2.1 WATER REPELLENTS

A. Silicate: Inorganic silicate-based curing, hardener and dustproofer for use on concrete either interior or exterior.Penetrating water-soluble, water-repellent, clear compound containing water, or other proprietary solvent carrier and densifier, that when applied in accordance with manufacturer's application recommendations will produce dense surface resistance to abrasion, moisture, and tire marking.

1. VOC Requirements: With 0g/L VOCs or less.

2. Products: Subject to compliance with requirements, provide one of the following:

a. BASF- Kure N Harden ® (Masterkure HD 200 WB)

b. Or approved equal, approved and accepted by the Architect and provided substitution complies with specified criteria, and resistant to staining from coffee, sodas, and markers.

PART 3 - EXECUTION

3.1 APPLICATION

A. Preparation: Clean substrate of substances that might interfere with penetration or performance of water repellents. Test for moisture content, according to water repellent manufacturer's written instructions, to ensure surface is sufficiently dry.

1. Formed Concrete: Remove oil, curing compounds, laitance, and other substances that could prevent adhesion or penetration of water repellents.

2. Clean concrete unit masonry pursuant to NCMA recommendations.

3. Application of sealer shall be evidence of substrate acceptance.

4. Remove all concrete fins, splatters, and finished concrete anomalies prior to sealer application.

B. Test for pH level, according to water repellent manufacturer's written instructions, to ensure chemical bond to silicate minerals.

C. Weather and Substrate Conditions: Do not proceed with application of water repellent under any of the following conditions, except with written instruction of manufacturer:

1. Ambient temperature is less than 40 deg F.

2. Concrete surfaces and mortar have cured for less than 28 days.

3. Rain or temperatures below 40 deg F are predicted within 24 hours.

4. Application is earlier than 24 hours after surfaces have been wet.

5. Substrate is frozen or surface temperature is less than 40 deg F.

6. Windy condition exists that may cause water repellent to be blown onto vegetation or surfaces not intended to be coated.

D. Protect adjoining work including sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is possibility of water repellent being deposited on surfaces. Cover live plants and grass.

E. Coordination with Sealants: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.

1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those used in the Work.

F. Test Application: Before performing water-repellent work, including bulk purchase and delivery of products, prepare small application in an unobtrusive location and in a manner approved by Architect to demonstrate final effect (visual, physical, and chemical) of planned application. Proceed with work only after Architect approves test application or as otherwise directed.

1. Revisions of planned application, if any, as requested by Architect, will be by Change Order if they constitute departure from requirements of the Contract Documents at time of contracting.

G. Apply heavy saturation spray coating of water repellent on surfaces indicated for treatment using low-pressure spray equipment. Comply with manufacturer’s written instructions for using airless spraying procedure, unless otherwise indicated.

H. Apply second saturation spray coating, repeating first application. Comply with manufacturer’s written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer’s technical representative if written instructions are not applicable to Project conditions.

I. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Repair damage cause by water-repellent application. Comply with manufacturer’s written cleaning instructions. Do allow residue to dry on the concrete surface or allow staining (white residue) to form.

J. After application is complete, remove protective coverings from adjacent surfaces and other protected areas.

3.2 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Provide services of a factory-authorized technical service representative to inspect and approve substrate before application and to instruct applicator on product and application method to be used.

END OF SECTION 07190

SECTION 07210 - BUILDING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Mineral-wool board insulation.

    a. Reference Drawings for UL Design options and assemblies for applicability of this product.

2. Rigid board foam (closed cell) insulation.
3. Mineral-wool blanket insulation.

    a. Reference Drawings for UL Design options and assemblies for applicability of this product.

4. Spray polyurethane foam insulation.
5. Sound batt insulation.

B. Related Sections:

1. Division 7 Section "Fire-Resistive Joint Systems" for insulation installed as part of a perimeter fire-resistive joint system.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, including, but not limited to installation instructions and attachment devices.

B. Manufacturer’s Certification: Manufacturer’s certification that product complies with the project requirements and is suitable for the use intended.

C. Manufacturer’s Thermal Performance Warranty.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

B. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.5 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

B. Manufacturer will maintain quality control during manufacturing so that the insulating product will perform as specified in test reports and ratings given in manufacturer's printed material.

C. Interior Wall Insulation shall not be produced with, or contain, any of the United States EPA regulated CFC compounds listed in the Montreal Protocol of the United Nations Environmental Program.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. All materials shall be delivered to the project site in their original unbroken containers, bearing the manufacturer's name, brand and specification designation.

PART 2 - PRODUCTS

2.1 MINERAL-WOOL BOARD INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Isolatek International.
2. Owens Corning.
3. Thermafiber.

B. Unfaced, Mineral-Wool Board Insulation: ASTM C 612; with maximum flame-spread and smoke-developed indexes of 15 and zero, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

1. Nominal density of 6 lb/cu. ft., Type II, thermal resistivity of 4.16 deg F x h x sq. ft./Btu x in. at 75 deg F.
2. Fiber Color: Darkened, where indicated.

2.2 RIGID BOARD FOAM (CLOSED CELL) INSULATION

A. Basis-of-Design: Subject to compliance with requirements, provide The Dow Chemical Company; Styrofoam Brand Z-Mate Extruded Polystyrene Foam Insulation.

B. Material Properties:

1. Rigid closed-cell extruded polystyrene foam insulation.
2. Comply with ASTM C 578-95, Type X, density 1.35 lb/cu. ft. min., compressive strength 15 psi (ASTM D 1621-94).
3. Thermal resistance: 5-year aged R-values of 5.4 and 5.0 min. °F-ft^2-h/Btu^2/inch at 40°F and 75° respectively (ASTM C 518-91).
4. Water absorption: Max. 0.1% by volume (ASTM C 272-91).
5. Surface Burning Characteristics:

a. Flame Spread: 15 or less.
b. Smoke Developed: 165.

C. Thickness: (R-5)/inch; Refer to Drawings for composite “R” value of the assembly.

2.3 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Guardian Building Products, Inc.
2. Johns Manville.
3. Owens Corning.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

C. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:

1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

2.4 MINERAL-WOOL BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Fibrex Insulations Inc.
2. Owens Corning.
3. Thermafiber.
4. Johns Manville.

B. Unfaced, Mineral-Wool Blanket Insulation: ASTM C 665, Type I (blankets without

membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

2.5 SPRAY POLYURETHANE FOAM INSULATION

A. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dow Chemical Company (The).
b. BASF Corporation.
c. Henry Company.

2. Minimum density of 1.5 lb/cu. ft., thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F.

2.6 SOUND ATTENUATION BATTS

A. Sound attenuation batts shall be unfaced glass fiber insulation and have been tested in accordance with ASTM C665, Type 1, ASTM E-84 and ASTM C-423, as manufactured by Owens Corning Corp. or approved equal.

B. Material thickness and locations shall be, but not limited to, the following:

1. 2-12 inch thick (NRC = .85): for all waste and drain pipes, and rainwater leaders in all walls.
2. 3-1/2 inch thick (NRC = 1.05): for sound walls, dropped ceilings of that same space as above, dropped ceilings at all bathrooms, and conference rooms, at a minimum. Refer to Drawings for extent.

2.7 ACOUSTICAL SEALANT (CAULKING)

A. Sealant shall be a non-hardening, non-drying and non-bleeding acoustical sealant as manufactured by TREMCO Sealant Systems or USG Sealant for use at sound walls only.

2.8 STYROFOAM PANELS

A. Styrofoam panels shall be STYROFOAM 60 High Load (roofs) and Square Edge XPS (walls), in 2.5 inch thickness as manufactured by Dupont or approved equal.

2.9 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with

self-locking washer in place.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
   b. Gemco; Spindle Type.

2. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.

B. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of 1 inch between face of insulation and substrate to which anchor is attached.

1. Product: Subject compliance with requirements, provide one of the following:

   a. Gemco; Clutch Clip.

C. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. AGM Industries, Inc.; TACTOO Adhesive.
   b. Gemco; Tuff Bond Hanger Adhesive.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

B. Verify that masonry joints are struck flush and that other conditions are satisfactory for proper installation.

C. Remove concrete fins and mortar projections that interfere with placement of insulation boards.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left

exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Mineral-Wool Insulation: Reference Drawings for UL Design options and assemblies for installation of mineral-wool insulation as required.

C. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed, and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

D. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.4 INSTALLATION OF BOARD INSULATION

A. Install board insulation where indicated on Drawings according to manufacturer's written instructions.

1. Hold insulation in place by securing metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place. Maintain cavity width of dimension indicated between insulation and wall face.
2. Install 2-furring channels vertically at 24” o.c., fit insulation boards between the furring channels.
3. Insulate around plumbing fixtures with a compatible spray foam insulation.
4. Seal the space between STYROFOAM Brand Z-MATE Extruded Polystyrene Foam Insulation and window frames with latex acrylic sealant.

3.5 INSTALLATION OF SOUND ATTENUATION BATTS

A. Sound batts shall be installed between metal studs continuous from floor slab to bottom of slab at ceiling.

B. Wrap and tape around piping, conduit, and duct work to provide an unbroken barrier.

C. Batts shall be butted tight at all joints and securely put into place.

D. Extend & overlap sound batts a minimum of 4’-0” beyond face of sound rated walls that do not extend to the structure.

3.6 INSTALLATION OF ACOUSTICAL SEALANT

A. Install sealant around perimeters of all code required fire rated sound-rated wall, including vertical surfaces, floors and ceilings.

B. Install sealant around all electrical outlet and switch boxes, and where pipes and conduit pass through code required sound-rated walls.

3.7 INSTALLATION OF STYROFOAM PANELS

A. STYROFOAM 60 High Load (roofs) and Square Edge XPS (walls) shall be installed as detailed, shown and/or indicated on the drawings or as specified; roof applications shall comply with wind load requirements.

3.8 MATERIAL AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and be replaced with new material in the best workmanlike manner at NO EXTRA COST to the Owner.

3.9 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07210

SECTION 07250 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Weather barrier membrane system, including manufacturer's accessories for cement siding and framed stucco and metal lath assemblies.

B. Fasteners

1.3 REFERENCES

A. ASTM International

1. ASTM C 920; Standard Specification for Elastomeric Joint Sealants
2. ASTM C 1193; Standard Guide for Use of Joint Sealants
3. ASTM D 882; Test Method for Tensile Properties of Thin Plastic Sheeting
4. ASTM D 1117; Standard Guide for Evaluating Non-woven Fabrics
5. ASTM E 84; Test Method for Surface Burning Characteristics of Building Materials
6. ASTM E 96; Test Method for Water Vapor Transmission of Materials
7. ASTM E 1677; Specification for Air Retarder Material or System for Framed Building Walls
8. ASTM E2178; Test Method for Air Permeance of Building Materials
9. ASTM E2357; Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

B. AATCC – American Association of Textile Chemists & Colorists

1. Test Method 127 Water Resistance: Hydrostatic Pressure Test

C. TAPPI

1. Test Method T-410; Grams of Paper and Paperboard (Weight per Unit Area)
2. Test Method T-460; Air Resistance of Paper (Gurley Hill Method)

1.4 SUBMITTALS

A. Refer to Section 01330 Submittal Procedures.

B. Product Data: Submit manufacturer current technical literature for each component of the system.

C. Samples: Weather Barrier Membrane, minimum 8-1/2 inches by 11 inch.

D. Quality Assurance Submittals

1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.
2. Manufacturer Instructions: Provide manufacturer's written installation instructions.
3. Manufacturer's Field Service Reports: Provide site reports from authorized field service representative, indicating observation of weather barrier assembly installation.

E. Closeout Submittals

1. Refer to Section 01780 Closeout Submittals.
2. Weather Barrier Warranty: Manufacturer's executed warranty form with authorized signatures and endorsements indicating date of Substantial Completion. Warranty period 10 years.

1.5 QUALITY ASSURANCE

A. Qualifications

1. Installer shall have experience with installation of weather barrier assemblies under similar conditions.
2. Installation shall be in accordance with weather barrier manufacturer's installation guidelines and recommendations.
3. Source Limitations: Provide weather barrier and accessory materials produced by single manufacturer.

B. Mock-up

1. Install mock-up using approved weather barrier assembly including fasteners, flashing, tape and related accessories per manufacturer's current printed instructions and recommendations. Mock up may be integrated into work.
2. Contact manufacturer's designated representative and Architect prior to weather barrier assembly installation, to perform required mock-up visual inspection and analysis as required for warranty.

C. Pre-installation Meeting

1. Refer to Section 01310 Project Management and Coordination.
2. Hold a pre-installation conference, two weeks prior to start of weather barrier installation. Attendees shall include Contractor, Architect, installer, Owner or Owner's designated representative, and weather barrier manufacturer's designated representative.

3. Review all related project requirements and submittals, status of substrate work and preparation, areas of potential conflict and interface, availability of weather barrier assembly materials and components, installer's training requirements, equipment, facilities and scaffolding, and coordinate methods, procedures and sequencing requirements for full and proper installation, integration and protection.

1.6 DELIVERY, STORAGE AND HANDLING

A. Refer to Section 01600 Product Requirements.

B. Deliver weather barrier materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Store weather barrier materials as recommended by weather barrier manufacturer.

1.7 SCHEDULING

A. Review requirements for sequencing of installation of weather barrier assembly with installation of other building elements and flashings to provide a weather-tight barrier assembly.

B. Schedule installation of weather barrier materials and exterior cladding within nine months of weather barrier assembly installation.

1.8 WARRANTY

A. Refer to Section 01740 Warranties and Bonds, and Section 01770 Closeout Procedures.

B. Special Warranty

1. Weather barrier manufacturer's warranty for weather barrier for a period of ten (10) years from date of purchase.
2. Pre-installation meetings and jobsite observations by weather barrier manufacturer for warranty is required prior to assembly installation.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. DuPont; 4417 Lancaster Pike, Chestnut Run Plaza 728, Wilmington, DE 19805; 1-800-44-TYVEK (8-9835); http://www.construction.tyvek.com

B. Basis of Design: spunbonded polyolefin, non-woven, non-perforated, weather barrier is based upon DuPont™ Tyvek® CommercialWrap® D and related assembly

components and accessories, or equal approved by the Architect. Dupont™ fluid applied “WB+” weather barrier and flashings will be acceptable in lieu of weather barrier wrap material/sheet.

C. Performance Characteristics:

1. Air Penetration: 0.001 cfm/ft^2 at 75 Pa when tested in accordance with ASTME2178. Type 1 when tested in accordance with ASTM E 1677. ≤0.04 cfm/ft @ 75 Pa when tested in accordance with ASTM E2357.
2. Water Vapor Transmission: 30 perms, when tested in accordance with ASTM E 96, Method B.
3. Water Penetration Resistance: 235 cm when tested in accordance with AATCC Test Method 127.
4. Basis Weight: 2.4 oz/yd^2, when tested in accordance with TAPPI Test Method T-410.
5. Air Infiltration Resistance: Air infiltration at >750 seconds, when tested in accordance with TAPPI Test Method T-460.
6. Tensile Strength: 33/41 lbs/in., when tested in accordance with ASTM D 822 , Method A.
7. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E 84. Flame Spread: 15, Smoke Developed: 25.

D. Other manufacturers and product substitutions will be considered for approval in accordance with Section 01600 Materials and Equipment, and that are approved by the Architect.

2.2 ACCESSORIES

A. Seam Tape: 3” DuPont™ Tyvek® Tape as distributed by DuPont or Architect approved weather barrier manufacturer’s seam tape, or fluid applied flashings for the sprayed-fluid applied weather barrier system.

B. Fasteners:

1. Steel Frame Construction DuPont™ Tyvek® Wrap Cap Screws: 1-5/8 inch rust resistant screw with 2-inch diameter plastic cap fasteners, or Architect approved weather barrier manufacturer’s fastener and cap screw system.

C. Sealants

1. Refer to Section 07920 Joint Sealants for additional requirements.
2. Provide sealants that comply with ASTM C 920, elastomeric polymer sealant to maintain watertight conditions.
3. Products:

   a. DuPont™ Commercial Sealant.
   b. Sealants recommended by the weather barrier manufacturer.

D. Adhesives:

1. Provide adhesive recommended by weather barrier manufacturer.
2. Products:

    a. Liquid Nails® LN-109
    b. Denso Butyl Liquid
    c. 3M High Strength 90
    d. Adhesives recommend by the weather barrier manufacturer.

E. Primers:

1. Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing.

2. Products:

    a. 3M High Strength 90
    b. Denso Butyl Spray
    c. Permagrip 105
    d. Primers recommended by the flashing manufacturer

F. Flashing, as required to meet manufacturer's system assembly for complete system. Flashings listed below are based on the Basis of Design, provide approved weather barrier manufacturer flashings.

1. DuPont™ FlexWrap™: Flexible membrane flashing materials for window openings and penetrations.
2. DuPont™ FlexWrap™ NF: Flexible membrane flashing materials for window openings and penetrations.
3. DuPont™ StraightFlash™: Straight flashing membrane materials for flashings and sealing penetrations such as masonry ties, etc.
4. DuPont™ Thru-Wall Surface Adhered Membrane with Integrated Drip Edge: Thru-Wall flashing membrane materials for flashing at changes in direction or elevation (shelf angles, foundations, etc.) and at transitions between different assembly materials.
5. Preformed Inside and Outside Corners and End Dams as distributed by DuPont: Preformed three-dimensional shapes to complete the flashing system used in conjunction with DuPont™ Thru-Wall Flashing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

3.2 INSTALLATION - WEATHER BARRIER

A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations

B. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.

C. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level

D. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacturer.

E. Openings: Extend weather barrier completely over openings.

F. Overlap weather barrier

1. Exterior corners: minimum 12 inches.
2. Seams: minimum 6 inches.

G. Weather Barrier Attachment:

1. Framed Construction: Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommend fasteners, space 6 -18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.

H. Apply 4 inch by 7 inch piece of weather barrier flashing manufacturer approved alternate to weather barrier membrane prior to the installation cladding anchors.

3.3 SEAMING

A. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.

B. Seal any tears or cuts as recommended by weather barrier manufacturer.

3.4 OPENING PREPARATION

A. Flush cut weather barrier at edge of sheathing around full perimeter of opening.

B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.5 FLASHING

A. Install flashing in accordance with manufacturer's requirements and standards. Coordinate flashing with other building elements.

B. Cut 9-inch wide DuPont™ FlexWrap™ or DuPont™ FlexWrap™ NF a minimum of 12 inches longer than width of sill rough opening.

C. Cover horizontal sill by aligning DuPont™ FlexWrap™ or DuPont™ FlexWrap™ NF edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.

D. Fan DuPont™ FlexWrap™ at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges. Mechanically fastening DuPont™ FlexWrap™ NF is not required.

E. Apply 9-inch wide strips of DuPont™ StraightFlash™ at jambs. Align flashing with interior edge of jamb framing. Start StraightFlash™ at head of opening and lap sill flashing down to the sill.

F. Spray-apply primer to top 6 inches of jambs and exposed sheathing.

G. Install DuPont™ FlexWrap™ or DuPont™ FlexWrap™ NF at opening head using same installation procedures used at sill. Overlap jamb flashing a minimum of 2 inches.

H. Coordinate flashing with other building elements.

I. Position weather barrier head flap across head flashing. Adhere using 4-inch wide DuPont™ StraightFlash™ over the 45-degree seams.

3.6 THRU-WALL FLASHING INSTALLATION

A. Apply primer per manufacturer's written instructions.

B. Install preformed corners and end dams bedded in sealant in appropriate locations along wall.

C. Starting at a corner, remove release sheet and apply membrane to primed surfaces in lengths of 8 to 10 feet.

D. Extend membrane through wall and leave ¼ inch minimum exposed to form drip edge.

E. Roll flashing into place. Ensure continuous and direct contact with substrate.

F. Lap ends and overlap preformed corners 4 inches minimum. Seal all laps with sealant.

G. Trim exterior edge of membrane 1-inch and secure metal drip edge per manufacturer's written instructions.

H. Terminate membrane on vertical wall. Terminate into reglet, counterflashing or with termination bar.

I. Apply sealant bead at each termination.

3.7 THRU-WALL FLASHING / WEATHER BARRIER INTERFACE AT BASE OF WALL

A. Overlap thru-wall flashing with weather barrier by 6-inches.

B. Mechanically fasten bottom of weather barrier through top of thru-wall flashing.

C. Seal vertical and horizontal seams with tape or sealing membrane.

3.8 FIELD QUALITY CONTROL

A. Notify manufacturer’s designated representative to obtain periodic observations of weather barrier assembly installation.

3.9 PROTECTION

A. Protect installed weather barrier from damage.

END OF SECTION 07250

SECTION 07260 - VAPOR RETARDER

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Products supplied under this section:

1. Vapor barrier and installation accessories for installation under concrete slabs.

1.2 SUMMARY

A Furnish all labor, materials, tools, equipment, etc. and services necessary and incidental to the complete fabrication, furnishing and erection of this Section as shown, noted, detailed, necessary and reasonably implied on the drawings and specifications at all new cast-in-place slab on grade concrete floors and pavement.

B. Where existing concrete slab-on-grade floors are removed or demoed for new work, install new vapor retarder.

1.3 RELATED SECTIONS

A. Division 2 – Site Work

B. Section 02361 – Termite Control

C. Section 03300 – Cast-in-place Concrete

1.4 REFERENCES

A. ASTM D 882 – Tensile Properties of Thin Plastic Sheeting.

B. ASTM D 1709 – Impact Resistance of Plastic Film by the Free-Falling Dart Method.

C. ASTM D 2582 – Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting.

D. ASTM D 3776 – Mass per Unit Area (Weight) of Woven Fabric.

E. ASTM D 4833 – Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

F. ASTM E 96 – Water Vapor Transmission of Materials.

G. ASTM E 1643 – Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

H. ASTM E 1745 – Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.

I. ACI 302.2R-06 – Guide for Concrete Slabs that Receive Moisture Sensitive Flooring Materials.

1.5 SUBMITTAL DATA AND SAMPLES

A. Submit product data under provisions of Section 01300 – Shop Drawings, Product Data and Samples.

B. Submit manufacturer's data describing products, product samples, installation procedures, a schedule of locations, and details of joint and construction penetrations.

1. Summary of test results per paragraph 9.3 of ASTM E 1745.
2. Manufacturer’s installation instructions for placement, seaming and penetration repair instructions.
3. All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.

1.6 STORAGE AND PROTECTION

A. Deliver materials to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and protection shall be in accordance with Section 01600 – Materials and Equipment.

1.7 WARRANTY

A. Refer to Section 01740 – Warranties and Bonds.

PART 2 – PRODUCTS

2.1 MEMBRANE VAPOR RETARDER

A. Comply with applicable portions of the Florida Building Code for minimum requirements for vapor barriers and dampproofing.

B. Provide products from the manufacturers listed below. Products of other manufacturers will be considered under standard substitution procedures. See Section 01600 – Materials and Equipment.

C. Underslab Membrane:

1. Vapor barrier shall have all of the following qualities:

a. Maintain permeance of less than 0.01 Perms [grains/(ft^2 · hr · inHg)] as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
b. Other performance criteria:

1) Strength: ASTM E1745 Class A.
2) Thickness: 15 mils minimum

2. Basis-of-Design Product: Stego Wrap 15 mil. Underslab membrane by Stego Industries, LLC; www.stegoindustries.com, 1-877-464-7834.

3. Alternate Manufacturer's:

a. Griffolyn Vaporguard by Reef Industries, Inc.

b. Perminator- 15mil. by W.R. Meadows

c. Other Manufacturers approved by the Architect.

D. Seem/Penetration & Perimeter Tape: Polyethylene, self-adhering type, 2-inches wide, compatible with sheet material as recommended by the membrane manufacturer. Perimeter tape shall be manufacturer's standard double-sided, or term bar may be used. Do not use Duct Tape; Provide manufacturer's approved system components.

E. Mastic: Manufacturer's standard mastic or sealant.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

A. All items in this Section shall be installed by experienced mechanics of this trade, in the best workmanlike manner of this trade's best standard practice and in strict accordance with the manufacturer's printed instructions.

3.2 PREPARATION

A Ensure that subsoil is approved by Architect or Geotechnical Engineer.

1. Level and compact base material.

3.3 VAPOR RETARDER INSTALLATION

A. Vapor retarder shall be placed over firmly compacted fill, lapping in direction concrete will be placed. Lap a minimum of 6 inches and seal laps, edges and cuts water tight with self-adhering tape. Place reinforcing steel and electrical conduit above membrane. If any tears result, mend with self-adhering tape sealed down watertight.

B. Vapor retarder for walls shall be placed and anchored per manufacturers recommendations and lapped a minimum of 6 inches and sealed, edges and cuts water tight with self-adhering tape.

3.4 MATERIAL AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and replaced with new material in the best workmanlike manner at no extra cost to the Owner.

END OF SECTION 07260

SECTION 07411 - METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Standing-seam metal roof panels.
2. Metal soffit panels.

B. Related Sections:

1. Division 5 Section "Steel Deck" for steel roof deck supporting metal roof panels.
2. Division 7 Section "Joint Sealants" for field-applied sealants not otherwise specified in this Section.
3. Division 7 Section “Building Insulation” for closed cell insulation.

1.3 DEFINITIONS

A. Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight roofing system.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Metal roof panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Delegated Design: Design metal roof panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of roof area when tested according to ASTM E 1680 at the following test-pressure difference:

1. Test-Pressure Difference: Positive and negative 1.57 lbf/sq. ft..
2. Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbf/sq. ft. and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.

3. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.

D. Water Penetration: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:

1. Test-Pressure Difference: 20 percent of positive design wind pressure, but not less than 6.24 lbf/sq. ft. and not more than 12.0 lbf/sq. ft.
2. Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbf/sq. ft. and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.
3. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.

E. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.

F. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with the wind-uplift-resistance class indicated on the drawings.

G. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F , ambient; 180 deg F, material surfaces.

H. Thermal Performance: Provide insulated metal roof panel assemblies with thermal-resistance value (R-value) indicated when tested according to ASTM C 518.

I. Energy Performance: Provide roof panels with solar reflectance index not less than 29 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of roof panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, side-seam and endlap joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work. Composite insulation sheathing foot nor location coordination with metal decking flutes to ensure fasteners are not exposed within finish face of the metal decking

1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches :

a. Flashing and trim

b. Gutters
c. Downspouts
d. Rainchains

C. Delegated-Design Submittal: For metal roof panel assembly indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation, licensed in the State of Florida.

D. Coordination Drawings: Roof plans, drawn to scale, on which the following are shown and coordinated with each other, based on input from installers of the items involved:

1. Roof panels and attachments
2. Roof-mounted items including roof hatches, equipment supports, pipe supports and penetrations, lighting fixtures, snow guards, and items mounted on roof curbs

E. Manufacturer Certificates: Signed by manufacturer certifying that roof panels comply with energy performance requirements specified in "Performance Requirements" Article.

1. Submit evidence of meeting performance requirements.

F. Qualification Data: For qualified Installer, professional engineer and testing agency.

G. Material Certificates: For thermal insulation, from manufacturer.

H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

I. Field quality-control reports.

J. Maintenance Data: For metal roof panels to include in maintenance manuals.

K. Warranties: Samples of special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

C. Source Limitations: Obtain each type of metal roof panels from single source from single manufacturer.

D. Surface-Burning Characteristics: Provide metal roof panels having insulation core material with the following surface-burning characteristics as determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

E. Fire-Resistance Ratings: Where indicated, provide metal roof panels identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
2. Combustion Characteristics: ASTM E 136.

F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical roof eave, including fascia, and soffit; approximately four panels wide by full eave width, including insulation, underlayment, attachments, and accessories.
2. Apcceptance of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

G. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect and Owner's designated representative, testing and inspecting agency representative, metal roof panel Installer, metal roof panel manufacturer's representative, deck Installer, and installers whose work interfaces with or affects metal roof panels including installers of roof accessories and roof-mounted equipment.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal roof panel installation, including manufacturer's written instructions.
4. Examine deck substrate conditions for compliance with requirements, including flatness and attachment to structural members.
5. Review structural loading limitations of deck during and after roofing.
6. Review flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
7. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.
8. Review temporary protection requirements for metal roof panel assembly during and after installation.
9. Review roof observation and repair procedures after metal roof panel installation.
10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal roof panels, and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.

B. Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.

E. Protect foam-plastic insulation as follows:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit metal roof panel work to be performed according to manufacturer's written instructions and warranty requirements.

B. Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication.

1.9 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

B. Coordinate metal roof panels with rain drainage work, flashing, trim, and construction of decks, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace metal roof panel assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.

b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

A. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 ; structural quality.
2. Surface: Smooth, flat finish.
3. Exposed Coil-Coated Finish:

a. 2-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

4. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil .

B. Panel Sealants:

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; and as recommended in writing by metal roof panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.2 FIELD-INSTALLED THERMAL INSULATION-PLYWOOD PANEL COMPOSITE

A. Extruded-Polystyrene Closed CEU Board Insulation: ASTM C 578, Type IV, 1.60-lb/cu. ft. minimum density unless otherwise indicated; with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively. 0.02 perm. R-30 minimum. Plywood Composite - Exterior grade sheathing bonded to the closed cell insulation.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Utilize sheet at eaves and valleys and penetrations. 30 to 40 mils thick minimum, consisting of slip-resisting, polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 240 deg F ; ASTM D 1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F ; ASTM D 1970.
3. Products: Subject to compliance with requirements, provide the following:

    a. Carlisle Coatings & Waterproofing Inc., Div. of Carlisle Companies Inc.; CCW WIP 300HT.
    b. Grace Construction Products; a unit of Grace, W. R. & Co.; Ultra.
    c. Henry Company; Blueskin PE200 HT.
    d. Metal-Fab Manufacturing, LLC; MetShield.
    e. Owens Corning; WeatherLock Metal High Temperature Underlayment.

2.4 MISCELLANEOUS MATERIALS

A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Exposed fasteners will not be acceptable.

B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.5 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips and fasteners in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.

B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and mechanically seaming panels together.

1. Basis-of-Design Product: Subject to compliance with requirements, provide ATAS, International Inc., 1 ½" "Field Lok" Lap Seam metal panel or comparable product by one of the following:

a. AEP-Span.
b. Englert, Inc.

2. Material: Aluminum-zinc alloy-coated steel sheet, 22 gauge nominal thickness.

a. Exterior Finish: Kynar 500 PVDF.
b. Color: As selected from Manufacture's full range of colors.

3. Batten: Same material, finish, and color as roof panels.
4. Clips: Floating to accommodate thermal movement.

a. Material: 0.028-inch- nominal thickness, aluminum-zinc alloy-coated steel sheet.

5. Joint Type: As standard with manufacturer.
6. Panel Coverage: 16 ½ inches (minimum).
7. Panel Height: 1 ½ inches.

2.6 METAL SOFFIT PANELS

A. General: Provide factory-formed metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.

B. Flush-Profile Metal Soffit Panels: Solid panels formed with vertical panel edges and flat pan between panel edges; with flush joint between panels.

1. Basis-of-Design Product: Subject to compliance with requirements, provide ATAS International; Opaline Panels or comparable product by one of the following:

2. Material: Aluminum-zinc alloy-coated steel sheet, 24 gauge nominal thickness.

    a. Exterior Finish: 2-coat fluoropolymer.
    b. Color: As selected from Duranar Coatings, 2-coat system and Duranar Sunstorm Coatings, 2-coat system colors-full range.
    c. If required, insert requirements for stainless steel. Verify availability with manufacturers.

3. Panel Coverage: 8 inches.
4. Panel Height: 1.0 inch.
5. Sealant: Factory applied within interlocking joint.

2.7 ACCESSORIES

A. Reference Section 07720 Roof Accessories for additional requirements.

B. Roof Panel Accessories: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
2. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

C. Flashing and Trim: Formed from same material as roof panels, prepainted with coil coating, minimum 0.018 inch thick. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.

D. Gutters: Formed from same material roof panels. Match profile as shown on the Architectural Drawings, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match roof fascia and rake trim.

2.8 FABRICATION

A. Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to

fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal roof panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weathertight and minimize noise from movements within panel assembly.

D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. End Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. End Seams for Other Than Aluminum: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA's "Architectural Sheet Metal Manual" or by metal roof panel manufacturer for application, but not less than thickness of metal being secured.

2.9 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of the Work.

B. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.

C. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

D. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.

E. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.

B. Miscellaneous Framing: Install subpurlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written instructions.

1. Soffit Framing: Wire tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

3.3 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches . Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days.

1. Roof perimeter for a distance up from eaves of 24 inches beyond interior wall line.
2. Valleys, from lowest point to highest point, for a distance on each side of 18 inches. Overlap ends of sheets not less than 6 inches .
3. Rake edges for a distance of 18 inches.
4. Hips and ridges for a distance on each side of 12 inches.
5. Roof to wall intersections for a distance from wall of 18 inches.
6. Around penetrating elements for a distance from element of 18 inches.

B. Apply slip sheet over underlayment before installing metal roof panels.

3.4 THERMAL INSULATION INSTALLATION

A. Composite Sheathing Board Insulation: Extend insulation in thickness indicated to cover entire roof. Comply with installation requirements in Division 7 Section "Building Insulation."

B. Fasteners shall not protrude into finish side of structural and acoustical metal decking; coordinate fastener location with flute of metal decking.

3.5 METAL ROOF PANEL INSTALLATION, GENERAL

A. Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.

B. Thermal Movement. Rigidly fasten metal roof panels to structure at one and only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction. Predrill panels for fasteners.

1. Point of Fixity: Fasten each panel along a single line of fixing located at eave.
2. Avoid attaching accessories through roof panels in a manner that will inhibit thermal movement.

C. Install metal roof panels as follows:

1. Commence metal roof panel installation and install minimum of 1000 square feet in presence of factory-authorized representative.
2. Field cutting of metal panels by torch is not permitted.
3. Locate and space fastenings in uniform vertical and horizontal alignment.
4. Provide metal closures at rake edges and each side of ridge and hip caps.
5. Flash and seal metal roof panels with weather closures at eaves, rakes, and perimeter of all openings.
6. Install ridge and hip caps as metal roof panel work proceeds.
7. End Splices: Locate panel end splices over, but not attached to, structural supports. Stagger panel end splices to avoid a four-panel splice condition.
8. Install metal flashing to allow moisture to run over and off metal roof panels.

D. Fasteners:

1. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized-steel fasteners for surfaces exposed to the interior.

2. Fasteners to be fully concealed.

E. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

F. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

1. Coat back side of roof panels with bituminous coating where roof panels will contact wood, ferrous metal, or cementitious construction.

G. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.

1. Seal metal roof panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal roof panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

3.6 METAL ROOF PANEL INSTALLATION

A. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.

3.7 METAL SOFFIT PANEL INSTALLATION

A. In addition to complying with requirements in "Metal Roof Panel Installation, General" Article, install metal soffit panels to comply with requirements in this article.

B. Metal Soffit Panels: Provide metal soffit panels full width of soffits. Install panels perpendicular to support framing.

1. Flash and seal panels with weather closures where metal soffit panels meet walls and at perimeter of all openings.

C. Metal Fascia Panels: Align bottom of panels and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

3.8 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

C. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

D. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
1. Connect downspouts to underground drainage system indicated.

E. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.9 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal roof panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.10 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.

C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.11 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07411

SECTION 07421 – Metal Wall Panels

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes:
   1. Factory-formed: concealed-fastener, metal wall panels.
   2. Finish must conform to the "Metal Construction Association Certified Premium Painted™" designation. Manufacture's full range of colors.

B. Related Sections include the following:
   1. Division 5 Section "Cold Formed Metal Framing"
   2. Division 6 Section "Rough Carpentry"
   3. Division 7 Section "Sheet Metal Flashing and Trim"
   4. Division 13 Section "Metal Building Systems"

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide metal wall panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.

B. System shall meet performance criteria as installed. Either test data or signed and sealed engineering calculations shall document the performance of the panel system to meet design loads required.

C. Wind Loading: Design and size components to withstand dead and live loads caused by wind pressures as follows:
   1. Refer to the drawings for the wind loading criteria.

D. Maximum Deflection under Design Loads:
   1. 1/180 of span

E. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of wall area when tested according to ASTM E 283 at a static-air-pressure difference of 6.24lbf/sq. ft.

F. Water Penetration: No water penetration when tested according to ASTM E 331 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft.

1.5 SUBMITTALS

A. Product Data: Manufacturer's current product specifications and installation instructions.
   1. Metal wall panels
   2. Flashing and trim.
   3. Accessories
   4. Florida Product Approval Certifications for exterior building elements, if required by Authorities Having Jurisdiction

B. Shop Drawings:
   1. Include small-scale elevations, as required.
   2. Show details of trim and flashing conditions, fastening and anchorage methods, weatherproofing techniques, terminations, and penetrations.

C. Samples:
   1. Selection Samples: Submit actual metal chips with full range of colors available for Architect's selection.
   2. Verification Samples: Submit two samples of each type of metal panel required, not less than 12 inches (305mm), and illustrating finished panel profile.

D. Product Test Reports: Submit copies of test reports or load tables verifying performance capability of panel system:
   1. Metal Wall Panels: Include reports for UL 790/ASTM E 108, ASTM E 283, ASTM E 331, Field Tested, ASTM E 84 Flame Spread Rating, Paint Performance Tests.
   2. Fastener test and pull-out calculations
   3. Load tables
   4. Maintenance Data

E. Sample Warranty.

1.6 QUALITY ASSURANCE

A. Installer: Company specializing in the type of work required for this project, with not less than 2 years of documented experience.

B. Pre-Installation meeting: Convene meeting not less than one week prior to beginning installation between general contractor, installing contractor, owner's representative and manufacturer.

1.7 DELIVERY, STORAGE & HANDLING

A. Do not deliver materials of this section to project site until suitable facilities for storage and protection are available.

B. Protect materials from damage during transit and at project site. Store under cover, but sloped to provide positive drainage. Do not expose materials with strippable protective film to direct sunlight or extreme heat.

C. Do not allow storage of other materials or allow staging of other work on installed metal panel system.

D. Upon receipt of delivery of metal panel system, and prior to signing the delivery ticket, the installer is to examine each shipment for damage and for completion of the consignment.

1.8 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Fluoropolymer Finish Warranty Period: 30 years from date of Substantial Completion.

B. Special Installer's Warranty: Specified form in which Wall Installer agrees to repair or replace components of custom-fabricated sheet metal wall that fail in materials or workmanship within 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer's Qualifications: All panels are to be factory formed and packaged per job requirements.
   1. Manufacturer shall have a minimum of ten (10) years' experience in the factory fabrication of metal wall panels.
   2. Manufacturer must be certified to ISO 9001:2008 with design.

B. Basis of Design shall be ATAS International, Inc. No other manufacturer of metal wall systems shall be accepted as an alternate product without prior written approval by the Architect.

C. Coordinate with insulation requirements as noted by Architect.

D. Secondary framing members as required for load criteria and wind requirements.

2.2 CONCEALED-FASTENER, LAP-SEAM METAL WALL PANELS

A. Concealed-fastener, Lap seam Metal Wall Panels: Provide factory-formed metal wall panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation

B. Trapezoidal-Rib-Profile, Exposed-Fastener Metal Wall Panels: Formed with raised, trapezoidal ribs at 4 inches o.c. that are evenly spaced across panel width, and with rib/recess sides angled at 60 degrees or more.
   1. Basis-of Design Product: ATAS International, Inc.; Rigid Wall - MFN160
   2. Available Manufacturers:
      a. ATAS International, Inc.
      b. Or Architect-approved alternate manufactures
   3. Material: Aluminum - .040 thick
      c. Texture: Smooth
      d. Finish: KYNAR 5000® PDVF or HYLAR 5000® Finish
      e. Color: A selection from Manufacture's full range of colors to be chosen later by the Architect
   4. Panel Coverage: 16"
   5. Panel Height: 15/16"
   6. Panel Application Orientation: Horizontal.

2.3 FABRICATION

A. Panels:
   1. Panels to be Factory fabricated in a controlled environment.
   2. Panels to be tension leveled during roll forming process.
   3. Panels to be produced in longest lengths possible, except when modular units are utilized.

B. Form all components true to shape, accurate in size, square and free from distortion or defects. Cut panels to precise lengths indicated on approved shop drawings or as required by field conditions.

C. Accessories: Factory fabricates trim and flashing components in standard 12-foot lengths.
   1. Form panel lines, breaks, and angles to be sharp and true, with surfaces free from warp and buckle.
   2. Fabricate wall panels as required to maintain fabrication tolerances and to withstand design loads.

D. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

E. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

F. Panels, fabrication and installation shall meet the requirements of the Metal Construction Association Preformed Metal Wall Guidelines

PART 3 - EXECUTION

3.1 PREPARATION

A. Field Measurements
   1. Field measurements should be taken by the installer for verification of dimensional correctness in relationship to original plans, prior to providing manufacturer with a bill of material.

B. Delivery, Storage and Handling
   1. Do not deliver materials of this section to project site until suitable facilities for storage and protection are available.
   2. Protect materials from damage during transit and at project site. Store under cover, but sloped to provide positive drainage. Do not expose materials with strippable protective film to direct sunlight or extreme heat.
   3. Do not allow storage of other materials or allow staging of other work on installed metal panel system.
   4. Upon receipt of delivery of metal panel system, and prior to signing the delivery ticket, the installer is to examine each shipment or damage and for completion of the consignment.

C. Sequencing and Scheduling
   1. Installer shall coordinate with general contractor as to scheduled delivery time after receipt of field verified bill of material by manufacturer as it relates to actual project scheduling.

3.2 METAL WALL PANEL INSTALLATION, GENERAL

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
   1. Field cutting of metal wall panels by torch is not permitted.
   2. Rigidly fasten metal wall panels and allow for thermal expansion and contraction as required by the panel manufacturer. Pre-drill panels as required.
   3. Install screw fasteners.
   4. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
   5. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as necessary for waterproofing and material compatibility.
   6. Provide weatherproof seals for pipe and conduit penetrating exterior walls.

B. Fasteners: Use fasteners of size and length as required for compatibility with substrate.
   1. Aluminum Wall Panels: Use stainless-steel fasteners or metallic coated fasteners for surfaces exposed to the exterior and aluminum or galvanized steel fasteners for surfaces exposed to the interior.
   2. Concealed fasteners shall have a high performance coating
   3. Metal Protection: Where dissimilar metals will contact each other or corrosive

substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal wall panel manufacturer.

4. Coat back side of aluminum wall panels with bituminous coating where wall panels will contact wood, ferrous metal, or cementitious construction.

C. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies.

D. Provide water and air infiltration retarder / barriers as noted within project documents.

3.3 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete sheet metal roofing assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual" and NRCA Waterproofing Manual. Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
3. Panels, fabrication and installation shall meet the requirements of the Metal Construction Association Preformed Metal Wall Guidelines.

B. Coordinate with installation of:

1. Cold Formed Metal Framing, as noted in Section 5
2. Rough Carpentry, as noted in Section 6
3. Sheet Metal Flashing and Trim, as noted in Section 7

3.4 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed. Maintain in a clean condition during construction.

B. Protection:

1. Provide as required completed work of this section will be without damager or deterioration at date of substantial completion.

C. Touch up minor abrasions with matching paint provided by panel manufacturer. Remove and replace panels that cannot be satisfactorily touched up. See Metal Construction Association Technical Bulletin #95-1051.

D. Sweep and remove chips, shavings and dust from roof on a daily basis during installation period. Leave installed work clean, free from grease, finger marks and stains. Remove all protective masking from material immediately after installation of

product.

E. Upon completion of installation, remove scraps and debris from project site.

F. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt and sealant.

END OF SECTION 07421

SECTION 07464 – CEMENT SIDING

PART 1 GENERAL

1.0 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.1 SECTION INCLUDES

A. Fiber cement lap siding, trim, molding and accessories; and vapor barrier for exterior cladding.

1.2 RELATED SECTIONS

A. Section –“ Rough Carpentry”

B. Section – “Weather Barriers”

C. Section – “Exterior Painting”

1.3 REFERENCES

A. AS D3359 - Standard Test Method for Measuring Adhesion by Tape Test, Tool and Tape.

B. AS E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

1.4 SUBMITTALS

A. Submit under provisions of Section 01330– Submittal Procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Provide detailed drawings of atypical non-standard applications of cementitious siding materials which are outside the scope of the standard details and specifications provided by the manufacturer, including flashing details, windows sills & trim details.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 4 by 6 inches (100 by 150 mm), representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Minimum of 2 years experience with installation of similar products.

B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
1. Finish areas designated by Architect.

2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
3. Remodel mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store siding on edge or lay flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

A. Product Warranty: Limited, non-pro-rated product warranty.
1. Lap siding for 30 years.
2. Trim boards for 15 years.

B. Finish Warranty: Limited product warranty against manufacturing finish defects.
1. When used for its intended purpose, properly installed and maintained according to the manufacture’s published installation instructions.

C. Workmanship Warranty: Application limited warranty for 2 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: James Hardie Building Products, Inc., or Architect approved equal. James Hardie Building Products, is located at: 231 S. La Salle St. Suite 2000; Chicago, IL 60604; Toll Free Tel: 877-236-7526; Email: requestinfo(info@jameshardie.com); Web:www.jameshardiepros.com|www.jameshardie.com,

B. Requests for approval of equal substitutions will be considered in accordance with provisions of Section 01600 - Materials and Equipment

2.2 SIDING AND TRIM (Basis of Design)

A. HardiePlank HZ10 lap siding, ,
1. Fiber-cement siding - complies with ASTM C 1186 Type A Grade II.
2. Fiber-cement siding - complies with ASTM E 136 as a noncombustible material.
3. Fiber-cement siding - complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5.

B. 2X Smooth HardieTrim:
1. 2X Smooth HardieTrim manufactured by James Hardie Building Products, Inc.
2. Overall Thickness: 1-1/2 in (38 mm).
3. Width: 5-1/2 inch (140 mm).(Refer to Drawings for other sizes)
4. Width: 7-1/4 inch (184 mm).
5. Width: 9-1/4 inch (235 mm).

6. Texture: Smooth.

2.3 FASTENERS

A. Wood Framing Fasteners:
1. Wood Framing: 0.121 inch (3 mm) shank by 0.371 inch (9.4 mm) head by 1-1/4 inches (32 mm) corrosion resistant roofing nails.

B. Metal Framing:
1. Metal Framing: 1-5/8 inches (41 mm) No. 8-18 by 0.323 inch (8.2 mm) head self-drilling, corrosion resistant S-12 ribbed buglehead screws.

C. Masonry Walls:
1. Masonry Walls: Aerico Stud Nail, ET&F ASM No.-144-125, 0.14 inch (3.6 mm) shank by 0.30 inch (7.6 mm) head by 2 inches (51 mm) long corrosion resistant nails.

2.4 FINISHES

A. Factory Primer: Provide factory applied universal primer.
1. Primer: Factory primed by James Hardie.
2. Topcoat: Refer to Section 09911 - exterior finish; custom color.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If infill framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Nominal 2 inch by 4 inch (51 m by 102 mm) PT. wood framing selected for minimal shrinkage and complying with local building codes, including the use of water-resistive barriers or vapor barriers. Minimum 1-1/2 inches (38 mm) face and straight, true, of uniform dimensions and properly aligned.
1. Install water-resistive barriers and claddings to dry surfaces.
2. Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.
3. Protect siding from other trades.

D. Minimum 16-gauge (54 mm) 6” inches (92 mm) C-Stud 24 inches (610 mm) maximum on center metal framing complying with local building codes, including the use of water-resistive barriers and/or vapor barriers. Minimum 1-1/2 inches (38 mm) face and straight, true, of uniform dimensions and properly aligned.
1. Install water-resistive barriers and claddings to dry surfaces.
2. Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.
3. Protect siding from other trades.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Install a water-resistive barrier is required in accordance with local building code requirements.

D. The water-resistive barrier must be appropriately installed with penetration and junction flashing in accordance with local building code requirements.

E. Install weather barrier in accordance with local building code requirements and manufacture’s requirements

F. Seal all joints flash and lap weather barrier per manufacture’s requirements.

3.3 INSTALLATION- SIDING

A. Install materials in strict accordance with manufacturer's installation instructions.

B. Starting: Install a minimum 1/4 inch (6 mm) thick lath starter strip at the bottom course of the wall. Apply planks horizontally with minimum 1-1/4 inches (32 mm) wide laps at the top. The bottom edge of the first plank overlaps the starter strip.

C. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.

D. Align vertical joints of the planks over framing members.

E. Butt joints must not fall within 4 inches (102 mm) of a stud or furring strip. Do not nail within 2 inches (51 mm) of the end of planks.

F. Maintain clearance between siding and adjacent finished grade.

G. Locate splices at least one 24” inches away from window and door openings.

H. For proper fastener selection and fastening schedules for various wind load requirements and framing options, refer to the Technical Data Sheet per FBC-NOA.

3.4 INSTALLATION - TRIM

A. Install materials in strict accordance with manufacturer's installation instructions. Install flashing around all wall openings.

B. Fasten through trim into structural framing or code complying sheathing. Fasteners must penetrate minimum 3/4 inch (19 mm) or full thickness of furring or substrate. Additional fasteners may be required to ensure adequate security.

C. Place fasteners no closer than 3/4 inch (19 mm) and no further than 2 inches (51 mm) from side edge of trim board and no closer than 1 inch (25 mm) from end. Fasten maximum 16 inches (406 mm) on center.

D. Maintain clearance between trim and adjacent finished grade.

E. Trim inside corner with a single board trim both side of corner.

F. Outside Corner Board Attach Trim on both sides of corner with 16 gage corrosion resistant finish nail 1/2 inch (13 mm) from edge spaced 16 inches (406 mm) apart, weather cut each end spaced minimum 12 inches (305 mm) apart.

G. Allow 1/8-inch gap between trim and siding.

H. Seal gap with silicone sealant.

I. Shim frieze board as required to align with corner trim.

J. Fasten through overlapping boards. Do not nail between lap joints.

K. Overlay siding with single board of outside corner board then align second corner board to outside edge of first corner board. Do not fasten trim boards to adjacent boards; secure to the substrate.

L. Finish factory primed siding with a minimum of one coat of high-quality 100 percent acrylic or latex or oil based exterior grade paint within 180 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before final acceptance.

END OF SECTION

SECTION 07620 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Formed Products:

a. Formed low-slope roof sheet metal fabrications.
b. Formed overhead-piping safety pans.

B. Related Sections:

1. Division 6 Section "Miscellaneous Carpentry" for wood nailers, curbs, and blocking.
2. Division 7 Section "Roof Accessories" for equipment supports, vents, and other manufactured roof accessory units.

1.3 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:

1. Identification of material, thickness, weight, and finish for each item and location in Project.
2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
4. Details of termination points and assemblies, including fixed points.
5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
7. Details of special conditions.
8. Details of connections to adjoining work.
9. Detail formed flashing and trim at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Initial Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.

1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
3. Accessories and Miscellaneous Materials: Full-size Sample.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified fabricator.

B. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.9 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, dead soft, fully annealed.

1. Finish: Brushed.
2. Surface: Smooth, flat.

C. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Surface: Smooth, flat and mill phosphatized for field painting.
2. Three-Coat Flouropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
3. Color: As selected by Architect from manufacturer’s full range.
4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.2 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.
3. Products: Subject to compliance with requirements, provide one of the following:

    a. Carlisle Coatings & Waterproofing Inc.; CCW WIP 300HT.
    b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
    c. Henry Company; Blueskin PE200 HT.
    d. Metal-Fab Manufacturing, LLC; MetShield.
    e. Owens Corning; WeatherLock Metal High Temperature Underlayment.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

    a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
    b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable

for metal being fastened.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
4. Fasteners for Aluminum-Zinc Alloy-Coated Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.

C. Solder:

1. For Stainless Steel: ASTM B 32, Grade Sn60, with an acid flux of type recommended by stainless-steel sheet manufacturer.
2. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

H. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Obtain field measurements for accurate fit before shop fabrication.
3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

D. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

E. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

F. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

G. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

H. Do not use graphite pencils to mark metal surfaces.

I. Do not use segments to fabricate arches. Provide seams where indicated on Drawings.

2.5 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Base Flashing: Fabricate from the following materials:

1. Stainless Steel: 0.019 inch thick.

B. Counterflashing: Fabricate from the following materials:

1. Stainless Steel: 0.019 inch thick.

C. Flashing Receivers: Fabricate from the following materials:

1. Stainless Steel: 0.016 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. General: Install underlayment as indicated on Drawings.

B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

3.3 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
5. Torch cutting of sheet metal flashing and trim is not permitted.
6. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.

1. Coat back side of uncoated aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or

install a course of polyethylene sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

D. Fastener Sizes: Use fasteners of sizes that will penetrate metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal joints as shown and as required for watertight construction.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Do not solder metallic-coated steel and aluminum sheet.
2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
3. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

G. Rivets: Rivet joints in uncoated aluminum where indicated and where necessary for strength.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Secure in a waterproof manner by means of

snap-in installation and sealant or lead wedges and sealant or interlocking folded seam or blind rivets and sealant and anchor and washer at 36-inch centers at concealed conditions (not visible from public view.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07620

SECTION 07720 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Equipment supports.
2. Equipment pipe supports and conduit sleeves.
3. Preformed flashing sleeves.
4. Square/rectangular, elbows, and offsets gutters.
5. Precast splash blocks.
6. Gutter & rain chains.

B. Related Sections:

1. Division 5 Section "Metal Fabrications".
2. Division 7 Section “Metal Roof Panels”.

1.3 REFERENCES

A. ASTM International (ASTM):

1. ASTM A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
2. ASTM A527 - Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality.
3. ASTM A568 - Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
4. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
5. ASTM B6 - Standard Specification for Zinc.
6. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. FBC Product Approval: Roof accessories mounted to the roof shall be in compliance with the FBC product approval requirements or shall be engineered to comply with the wind speed resistance required for the project. Signed and sealed engineered drawings may be provided by a licensed engineer in the State that the project is located in, in lieu of Florida Product approval certification.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:

1. Size and location of roof accessories specified in this Section.
2. Method of attaching roof accessories to roof or building structure.
3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
4. Required clearances.

B. Warranty: Sample of special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.8 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be

supported.

1.9 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section shall be supplied by a single manufacturer with a minimum of ten years' experience.

B. Installer Qualifications: Minimum 2 years experience installing similar products.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.

B. Store products in clean, dry, sheltered area off the ground until ready for use.

1.11 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

A. Aluminum Sheet: ASTM B 209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.

1. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
2. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.

B. Aluminum Extrusions and Tubes: ASTM B 221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used, otherwise mill finished.

C. Stainless-Steel Sheet and Shapes: ASTM A 240/A 240M or ASTM A 666, Type 304.

2.2 GUTTERS & RAIN CHAINS

A. Basis of Design: Chris Industries, located at: 290 Larkin Ave.; Wheeling, IL 60090; Toll ReWeb:www.chrisind.com

B. Size as indicated on drawings.

C. Alternate manufacturers shall include:

1. Architectural Products Company

2. AMSI - Supply.

3. or Architect approved equal.

D. Requests for substitutions will be considered in accordance with provisions of the General Requirements and Specifications.

E. Gutter Materials: The finishes listed in this specification are made using materials listed below as applicable and as specified.

1. Aluminum: Kynar Painted Flat Sheet: Alloy 3105-H15. ASTM B209.

F. Size

1. Rain Chain links:

a. 316 stainless steel

2. Installation Base

a. Aluminium

G. Precast Concrete Splash Blocks:

1. Precast concrete splash block 10” wide by 24” long; reinforces Grey concrete:4000 PSI @ 28 days as manufacturer by Commercial Concrete Products, Inc. or architect approved equal, with stainless steel rain chain – epoxy set stainless steel eye bolt.

2.3 WEATHER VANE

A. Basis of Design: Weathervane Factory, located at: 1318 Main Road, Eddington, ME, 04428, Ph. No.: 1-207-843-0040, www.weathervanefacyory.com, or Architect approved equal. Model Number 131 American Eagle, with coper spacer balls, directional, rod and ring and attachment devices for roof mounting.

B. Requests for Substitutions will be considered in accordance with provisions of the

General Requirements and Specifications.

C. Weathervane Materials: Copper with factory applied patina finish. Filed applied exterior grade clear coat polyurethane coating over the entire weathervane assemble and components.

1. Size: 36 inches long, 27 inches high, and a 36-inch wingspan

2. 16-ounce copper, 24 gauge

3. Four-pronged stainless-steel mount, model number BHP046.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Glass-Fiber Board Insulation: ASTM C 726, thickness as indicated.

C. Board Insulation: ASTM C 1289, thickness as indicated, to match roof insulation.

D. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches thick.

E. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals or wood blocking, or curbs being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:

1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.

F. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

G. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

H. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 EQUIPMENT SUPPORTS

A. Equipment Supports: Internally reinforced metal equipment supports capable of supporting superimposed live and dead loads and FBC wind loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, stepped integral metal cant (as required by roof manufacturer) raised the thickness of roof insulation, and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Thaler Metal USA, Inc.
   b. Custom Solution Roof and Metal Products.
   c. LM Curbs.
   d. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
   e. Roof Products, Inc.
   f. Thybar Corporation.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported. Provide a minimum of 1’-0” clear above roof to bottom of support frame.

C. Loads: As indicated on Drawings.

D. Material: Aluminum sheet, 0.090 inch thickness as required to meet or exceed loading requirements.

1. Finish: Baked enamel or powder coat.
2. Color: As selected by Architect from manufacturer's full range.

2.6 PREFORMED FLASHING SLEEVES

A. Exhaust Vent Flashing: Double-walled metal flashing sleeve or boot, insulation filled, with integral deck flange, 12 inches high above roof surface, with removable metal hood and slotted metal collar.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. Custom Solution Roof and Metal Products.
   b. Thaler Metal USA Inc.

2. Metal: Aluminum sheet, 0.063 inch thick.
3. Diameter: As indicated on Mechanical Drawings.
4. Finish: Manufacturer's standard.

B. Vent Stack Flashing: Metal flashing sleeve, uninsulated, with integral deck flange.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Custom Solution Roof and Metal Products.
b. Thaler Metal USA Inc.

2. Metal: Aluminum sheet, 0.063 inch thick.
3. Height: 13 inches.
4. Diameter: As indicated on Mechanical Drawings.
5. Finish: Manufacturer's standard.

2.7 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.4 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Verify dimensions of roof openings for roof accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.5 INSTALLATION

A. General: Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact

surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of stainless-steel roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.

C. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.

D. Equipment Pipe Support Installation: Install pipe supports so top surfaces are in contact with and provide equally distributed support along length of supported item.

E. Preformed Flashing-Sleeve Installation: Secure flashing sleeve to roof membrane according to flashing-sleeve manufacturer's written instructions.

F. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

3.6 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.

B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Division 9 painting Sections.

C. Clean exposed surfaces according to manufacturer's written instructions.

D. Clean off excess sealants.

E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07720

SECTION 07841 - PENETRATION FIRESTOP SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.

B. Related Sections:

1. Division 7 Section "Fire-Resistive Joint Systems" for joints in or between fire-resistance-rated construction, at wall/floor intersections, and in smoke barriers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency, and UL approved assembly.

1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Engineer must be registered in the State of Florida.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written

recommendations.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A single professional firestopping installation firm for the entire Building with penetration firestopping experience on similar applications in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:

1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:

    a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
    b. Classification markings on penetration firestopping correspond to designations listed by the following:

        1) UL in its "Fire Resistance Directory."
        2) FM Global in its "Building Materials Approval Guide."

C. Pre-installation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Grace Construction Products.
2. Hilti, Inc.
3. Specified Technologies Inc.
4. 3M Fire Protection Products.

2.2 PENETRATION FIRESTOPPING

A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. Fire-resistance-rated walls include fire walls fire-barrier walls smoke-barrier walls and fire partitions.
2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. Horizontal assemblies include floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies.
2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.

3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch wg at both ambient and elevated temperatures.

E. W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.

F. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

G. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

1. Permanent forming/damming/backing materials, including the following:

a. Slag-wool-fiber or rock-wool-fiber insulation.
b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
c. Fillers for sealants.

2. Temporary forming materials.
3. Substrate primers.
4. Collars.

2.3 MIXING

A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials,water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.3 INSTALLATION

A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.

C. Install fill materials for firestopping by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Identify penetration firestopping with permanent preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping.

Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 CLEANING AND PROTECTION

A. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

3.6 PENETRATION FIRESTOPPING SCHEDULE

A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.

B. Firestopping for Metallic Pipes, Conduit, or Tubing FS-MP-1:

1. UL-Classified Systems: C-AJ- 1226.
2. F-Rating: 3 hours.
3. L-Rating at Ambient: Less than 1 cfm/sq. ft..

4. W-Rating: No leakage of water at completion of water leakage testing.

C. Firestopping for Metallic Pipes, Conduit, or Tubing FS-MP-2:

1. UL-Classified Systems: W-L-1054.
2. F-Rating: 1 and 2 hours.
3. L-Rating at Ambient: Less than 1 cfm/sq. ft..
4. W-Rating: No leakage of water at completion of water leakage testing.

D. Firestopping for Nonmetallic Pipe, Conduit, or Tubing FS-NMP-1:

1. UL-Classified Systems: C-AJ- 2109.
2. F-Rating: 2 hours and 3 hours.
3. T-Rating: 0, 2, 3 hours.
4. W-Rating: No leakage of water at completion of water leakage testing.

E. Firestopping for Nonmetallic Pipe, Conduit, or Tubing FS-NMP-2:

1. UL-Classified Systems: W-L- 2078.
2. F-Rating: 1 hour and 2 hours.
3. T-Rating: 0, 1, 2 hours.
4. W-Rating: No leakage of water at completion of water leakage testing.

F. Firestopping for Cable Trays with Electric Cables FS-CT-1:

1. UL-Classified Systems: W-J- 4009.
2. F-Rating: 2 hours.

G. Firestopping for Cable Trays with Electric Cables FS-CT-2:

1. UL-Classified Systems: W-L- 4005.
2. F-Rating: 1 and 2 hours.

H. Firestopping for Insulated Pipes FS-IMP-1:

1. UL-Classified Systems: C-AJ- 5198.
2. F-Rating: 2 hours.
3. T-Rating: 0 and ½ Hour.
4. W-Rating: No leakage of water at completion of water leakage testing.

I. Firestopping for Insulated Pipes FS-IMP-2:

1. UL-Classified Systems: C-AJ- 5301.
2. F-Rating: 2 hours.
3. T-Rating: 0 and 1½ Hours.
4. W-Rating: No leakage of water at completion of water leakage testing.

J. Firestopping for Insulated Pipes FS-IMP-3:

1. UL-Classified Systems: W-L- 5029.
2. F-Rating: 1 and 2 hours.

3. T-Rating: ½ , ¾, 1, 1 ½ and 1 ¾ hours.
4. W-Rating: No leakage of water at completion of water leakage testing.
5. L-Rating at Ambient: 4 cfm/sq ft

K. Firestopping for Insulated Pipes FS-IMP-4:

1. UL-Classified Systems: W-L- 5028.
2. F-Rating: 1 and 2 hours.
3. T-Rating: ¾, hours.
4. W-Rating: No leakage of water at completion of water leakage testing.
5. L-Rating at Ambient: less than 1 cfm/sq ft

L. Firestopping for Miscellaneous Mechanical Penetrants FS-MDC-1:

1. UL-Classified Systems: W-J- 7089.
2. F-Rating: 2 hours.
3. T-Rating: 0 hour.
4. L-Rating at Ambient: Less than 1 cfm/sq. ft.

M. Firestopping for Miscellaneous Mechanical Penetrants FS-MDC-2:

1. UL-Classified Systems: W-L- 7149.
2. F-Rating: 2 hours.
3. T-Rating: 0 hour.
4. L-Rating at Ambient: Less than 1 cfm/sq. ft..

N. Firestopping for Groupings of Penetrants FS-MLP-1:

1. UL-Classified Systems: C-AJ- 1048.
2. F-Rating: 3 hours.
3. T-Rating: 1/2 hour.
4. L-Rating at Ambient: Less than 1 cfm/sq. ft..
5. W-Rating: No leakage of water at completion of water leakage testing.

O. Firestopping for Groupings of Penetrants FS-MLP-2:

1. UL-Classified Systems: W-L- 1173.
2. F-Rating: 3 and 4 hours.
3. T-Rating: 1 hour.
4. L-Rating at Ambient: Less than 1 cfm/sq. ft..

END OF SECTION 07841

SECTION 07844 - FIRE-RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.
2. Joints in smoke barriers.

B. Related Sections:
1. Division 7 Section "Through-Penetration Firestop Systems" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: For each fire-resistive joint system. Include location and design designation of qualified testing agency.

1. Where Project conditions require modification to a qualified testing agency's illustration for a particular fire-resistive joint system condition, submit illustration, with modifications marked, approved by fire-resistive joint system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Engineer must be registered in the State of Florida.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Installer Certificates: From Installer indicating fire-resistive joint systems have been installed in compliance with requirements and manufacturer's written recommendations.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fire-resistive joint systems.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A single professional firm for the entire project with experience in installing fire-resistive joint systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its fire-resistive joint system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

B. Fire-Test-Response Characteristics: Fire-resistive joint systems shall comply with the following requirements:

1. Fire-resistive joint system tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
2. Fire-resistive joint systems are identical to those tested per testing standard referenced in "Fire-Resistive Joint Systems" Article. Provide rated systems complying with the following requirements:

a. Fire-resistive joint system products bear classification marking of qualified testing agency.
b. Fire-resistive joint systems correspond to those indicated by reference to designations listed by the following:

1) UL in its "Fire Resistance Directory."

C. Pre-installation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Install and cure fire-resistive joint systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

B. Coordinate sizing of joints to accommodate fire-resistive joint systems.

C. Notify Owner's testing agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on day preceding each series of installations.

PART 2 - PRODUCTS

2.1 FIRE-RESISTIVE JOINT SYSTEMS

A. Where required, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which fire-resistive joint systems are installed. Fire-resistive joint systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

B. Joints in or between Fire-Resistance-Rated Construction: Provide fire-resistive joint systems with ratings determined per ASTM E 1966 or UL 2079:

1. Joints include those installed in or between fire-resistance-rated walls, floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies.
2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of construction they will join.
3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hilti, Inc.
    b. Specified Technologies Inc.
    c. 3M Fire Protection Products.

C. Joints at Exterior Wall/Floor Intersections: Provide fire-resistive joint systems with rating determined by ASTM E 119 based on testing at a positive pressure differential of 0.01-inch wg or ASTM E 2307.

1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hilti, Inc.
    b. Specified Technologies Inc.
    c. 3M Fire Protection Products.
    d. Thermafiber, Inc.

D. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079.

1. L-Rating: Not exceeding 5.0 cfm/ft of joint at 0.30 inch wg at both ambient and elevated temperatures.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hilti, Inc.
    b. Specified Technologies Inc.
    c. 3M Fire Protection Products.

E. Exposed Fire-Resistive Joint Systems: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

F. VOC Content: Fire-resistive joint system sealants shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

G. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to maintain ratings required. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing agency for systems indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:

1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates.

3.3 INSTALLATION

A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
2. Apply fill materials so they contact and adhere to substrates formed by joints.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Identify fire-resistive joint systems with a permanent preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels will be visible to anyone seeking to remove or penetrate joint system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Fire-Resistive Joint System - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Where deficiencies are found or fire-resistive joint systems are damaged or removed due to testing, repair or replace fire-resistive joint systems so they comply with

requirements.

C. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

3.7 FIRE-RESISTIVE JOINT SYSTEM SCHEDULE

A. Where UL-classified systems are indicated or as required to maintain ratings, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHBN or Category XHDG.

B. Wall-to-Wall, Concrete to concrete or CMU Fire-Resistive Joint Systems FRJS-1:

1. UL-Classified Systems: WW-D- 0001.
2. Assembly Rating: 1, 2 and 3 hour.
3. Nominal Joint Width: 1 inch.
4. Movement Capabilities: Class II - 12.5 percent compression or extension.
5. L-Rating at Ambient: Less than 1 cfm/ft..

C. Wall-to-Wall, Gypsum / Concrete or CMU Fire-Resistive Joint Systems FRJS-2:

1. UL-Classified Systems: WW-S- 0052.
2. Assembly Rating: 1, 2 and 3 hour.
3. Nominal Joint Width: 1 inch.
4. L-Rating at Ambient: Less than 1 cfm/ft..

D. Floor-to-Wall, Concrete Floor to Concrete or CMU Wall; Fire-Resistive Joint Systems FRJS-3:

1. UL-Classified Systems: FW-D-0023.
2. Assembly Rating: 1 hour 2 hours.
3. Nominal Joint Width: 2 inches.
4. Movement Capabilities: Class II - 19 percent compression or extension.
5. L-Rating at Ambient: Less than 1 cfm/ft..

E. Head-of-Wall, CMU or Concrete Partitions; Fire-Resistive Joint Systems FRJS-HWD-

CMU:

1. UL-Classified Systems: HW-D-1034.
2. Assembly Rating: 1 hour to 3 hour.

F. Head-of-Wall, gypsum Partitions; Fire-Resistive Joint Systems FRJS-HWD-GWB:

1. UL-Classified Systems: HW-D-0043.
2. Assembly Rating: 1 hour to 2 hour.

G. Perimeter Fire-Resistive Joint Systems PFRJS-1:

1. UL-Classified Perimeter Fire-Containment Systems: CW- S-2034.
2. Integrity Rating: 1 ½ to 2 hours.
3. Insulation Rating: 1/4 hour.
4. Linear Opening Width: 8 inches, maximum.
5. L-Rating at Ambient Temperature: Less than 1 cfm/ft..

H. Perimeter Fire-Resistive Joint Systems PFRJS-2:

1. UL-Classified Perimeter Fire-Containment Systems: CW- S-20349.
2. Integrity Rating: 1 ½ to 2 hours.
3. Insulation Rating: 1/4 hour.
4. Linear Opening Width: 8 inches, maximum.
5. L-Rating at Ambient Temperature: Less than 1 cfm/ft..

I. Perimeter Fire-Resistive Joint Systems PFRJS-3:

1. UL-Classified Perimeter Fire-Containment Systems: CW- S-2044.
2. Integrity Rating: 1 ½ to 2 hours.
3. Insulation Rating: 1/4 hour.
4. Linear Opening Width: 8 inches, maximum.
5. L-Rating at Ambient Temperature: Less than 1 cfm/ft..

END OF SECTION 07844

SECTION 07900 - CAULKING AND SEALANTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Furnish all labor, materials, tools, equipment, etc. and services necessary and incidental to the complete fabrication, furnishing and erection of this Section as noted, detailed, necessary, and reasonably implied on the drawings and in the specifications.

1.3 RELATED SECTIONS

A. Coordinate work of this Section with work of other Sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other Sections, including:

1. Section 07210 – Sound Reduction Sealants.

2. Section 07841 – Penetration Firestop Systems.

3. Section 08905 – Window Walls and Exterior Glazing.

4. Divisions 15 and 16, Mechanical, Plumbing, Fire Protection, Electrical.

1.4 DEFINITIONS

A. "Caulking Compound" shall apply only to materials and work in connection with the filling or closing of interior joints where expansion or contraction are of no consideration, and where filling and closing of these interior joints are primarily for appearance.

B. "Sealant" shall apply to materials and work to seal and make watertight all joints on the exterior of the building and joints on the interior of the building that may be expected to expand and contract.

C. "Silicone" shall apply to glazing systems including perimeter, butt joint, structural, storefront, and metal curtainwall.

D. “Mildew Resistant Sealant” shall apply to sealant to be applied to all interior tiled joints or other non-porous substrates that are subject to in-service exposures of high humidity and temperature extremes.

1.5 SUBMITTALS

A. Submit product data under provisions of Section 01300 – Shop Drawings,

Product Data, and Samples.

B. Complete data sheets clearly identifying all materials, specifications and locations where they are proposed for use in this project.

C. Manufacturer's printed data, specifications, and installation procedures.

D. Manufacturer’s compatibility statement that sealant bonding surfaces and materials are acceptable surfaces for proposed sealant and surface preparation requirements, including priming and cleaning criteria.

E. Manufacturer’s field pull test for existing adhesion, stain and primer requirements for each sealant application and sealant surface. Pull test shall be conducted in accordance with ASTM standards.

1.6 WARRANTY

A. Refer to Section 01700 - Project Closeout, Detail Requirements. Provide a warranty covering sealant materials and joint failure.

B. Joint failure is defined as:

1. Leaks of air or water.

2. Evidence of loss of cohesion - cohesive failure.

3. Fading of sealant material beyond manufacturer's standard printed Criteria.

4. Migration of sealant.

5. Evidence of loss of adhesion between sealant and joint edge - adhesive failure.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Section 01600 – Materials and Equipment and Section 01620 – Storage and Protection.

B. Deliver materials in their original unbroken containers, bearing the manufacturer's name and brand designation and specification number where applicable. Caulking compound, sealant, or components more than 6 months old shall not be used.

1.8 SCOPE

A. The work includes caulking and sealing all portions of new construction.

B. Specific materials and areas to be caulked or sealed include, but are not limited to, the following:

1. Door and window opening frames at interior and exterior of building

2. Door thresholds at exterior of building

3. Intersection of dissimilar materials at interior and exterior floors, walls, stairs, and ceilings of the buildings

4. Intersection or termination of specialty materials such as granite countertops, marble, tile, etc.

5. Stucco joints and accessories

6. Sheet metal work other than flashings

7. Joint conditions as directed by the Architect

PART 2 – PRODUCTS

2.1 CAULKING

A. Interior, air-conditioned areas, caulking compound shall be acrylic latex type, ASTM C834. Provide one of the following:

1. GE – RCS20

2. Sonneborn “Sonolac.”

3. Pecora “AC-20.”

4. Bostik “Chem-Calk 600/650.”

5. Tremco “Tremflex 834.”

2.2 ELASTOMERIC SEALANTS

A. Provide single-component or multi-component, low-modulus, non-sag polyurethane sealant that is suitable for continuous immersion in water; comply with ASTM C920, Type S or M, Grade NS, Class 25.

1. Acceptable Sealants:

a. Tremco “Vulkem 116/921/922.”

b Tremco, “Dymeric 511.”

c. Bostik “Chem Caulk 900.”

d. Pecora “Dynatrol 1.”

e. Sika “Sikaflex 1A,” Sikaflex 2cNS", or "Sikaflex 15LM

B. Provide single-component or multi-component polyurethane sealant having a Shore A hardness of not less than 25, or more than 50, and plus-or-minus 25 percent joint movement capability that is suitable for continuous immersion in water; comply with ASTM C920, Type S or M, Grade P or NS, Class 25.

1. Acceptable Sealants:

   a. Tremco “Vulkem 45/245/227.”

   b. Tremco “THC 900/901.”

   c. “Sikaflex-1a" or "Sikaflex-2c NS/SL"

C. Sealant shall meet ASTM C 920 for one part and two-part polysulfide base sealants.

1. Pecora “GC-9 Synthacalk,” one part.

2. Pecora “GC-5 Synthacalk,” two part.

3. Sonneborn “Sonolastic Sealant,” one part or two part.

   a. Color of sealants as selected by Architect from manufacturer's standard colors.

2.3 MILDEW RESISTANT SEALANT (INTERIOR WET AND TILED AREAS)

A. One-Part, Mildew-Resistant Silicone Sealant: ASMT C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and temperature extremes.

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.

C. Products: Subject to compliance with requirements, provide one of the following products:

1. Dow Corning “Dow Corning 786.”

2. GE Silicones “Sanitary 1700.”

3. Pecora “Pecora 898 Sanitary Silicone Sealant.”

2.4 SILICONE

A. Silicone sealants shall meet ASTM C 920.

B. Silicone shall be as manufactured by G.E., or Dow Corning, or Sika as recommended by the manufacturer as appropriate for the intended use.

C. Color as selected by the Architect.

2.5 PENETRATION SEALANT/FIRE RATED SEALANT SYSTEMS

A. See Section 07840 – Firestopping (Penetration Seals).

2.6 BOND BREAKERS

A. Bond breakers where required by sealant manufacturer.

2.7 PRIMER

A. Primers for joint groove shall be primers recommended by the caulking or sealant manufacturer as being required to seal the pores in the materials, the sides of the joint grooves, and as being compatible with the caulking or sealant being used.

2.8 BACKER MATERIAL

A. Backing material shall be a closed cell non-staining polyethylene in round or square shape as recommended by the manufacturer of the compound. Materials shall be free from oil or other staining elements. Oakum and other types of absorptive or open cell materials shall not be used.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

A. All items in this Section shall be installed by experienced skilled mechanics in the best workmanlike manner of the trade's best standard practice and in strict accordance with approved submittals.

3.2 JOINT DIMENSIONS

A. Depth of joint is defined as distance from outside face of joint to closest point of joint filler, whether joint filler is rod shaped or rectangular shaped.

B. Joints: Depth and width as required and confirmed by product manufacturer but no less than the following requirements.

1. Joints: Never less than 1/8 inch depth by 1/4 inch width, unless specifically approved by Architect.

2. For joints in concrete or masonry, depth of sealant must be 1/2 of the width of joint up to 1/2 inch wide. For expansion, other joints exceeding 1/2 inch in width, depth of sealant: no greater than 1/2 sealant width.

3. For joints in non-porous surfaces, metal, glass, sealant depth: minimum of 1/2 sealant width, in no case exceeding sealant width.

4. Contractor shall determine/verify that joint dimension limits noted above and required by the joint sealant manufacturer are met.

3.3 JOINT INSPECTION

A. Building joints shall be examined prior to application and any conditions detrimental to achieving a positive, weather-tight seal shall be reported to the General Contractor and the Architect.

B. All openings, joints, or channels to be sealed shall be thoroughly clean, dry, and free from dust, oil, grease, loose mortar, or any other foreign matter.

C. Surfaces with protective coatings that the sealant will come in contact with such as new aluminum or bronze, shall be wiped with approved solvent, and wiped dry with a clean cloth; to remove any protective coating not tightly adhered and any oil deposit that may be left on the metal surfaces.

D. All joints shall have a closed-cell polyethylene joint backing, which shall be packed into the joint within 1/2 inch of the surface.

E. Concrete shall be fully cured, free of release agents, curing compounds, loose aggregate and other surface treatments. Treated surfaces shall be tested for adhesion before proceeding with sealant work.

F. Joint spaces and surfaces: Thoroughly dry before installation of sealant materials. Do not install sealant materials when temperature is below 40 degrees F, or during or after rain or fog.

3.4 INSTALLATION

A. The mixing and application of all caulking/sealant compounds shall be in strict accordance with the manufacturer's instructions.

B. All joints where caulking compounds are to be applied in excess of 1/2 inch in depth shall be packed with a polyethylene foam rod stack filler material to within 1/2 inch from the face to surface. The caulking width and depth in relation to joint movement shall be a maximum of 25 percent compression and 25 percent extension.

C. Bond breaker strips shall be used where sufficient room for backer rods does not exist or as required by manufacturer.

D. Primer shall be used as it comes from can, unaltered. Prime joints before insertion of joint filler materials, per caulking/sealant manufacturer's directions.

E. Seal the heads, sills, and jambs of all windows and the heads and jambs of doorframes where they abut walls.

F. Sealant shall be applied with full gun pressure forcing the caulking well back into joint. Build the sealant out to a 45-degree angle in all corners, finish the sealant bead by tooling at the doorframes in masonry walls.

G. Wipe all excess compound and leave in proper condition for painting. Use only a paintable sealant material.

H. Exterior thresholds shall be set in a full bed of exterior-type sealant compound.

I. Fill joint with filler material so that depth and width of joint have relationships as noted herein before under "Joint Dimensions".

J. Sealant materials shall be applied within the "application life" recommended by

manufacturer for prevailing temperature and humidity conditions.

K. Protect exposed surfaces adjacent to joints to prevent permanent staining or other damage to adjacent work.

1. All joints shall be tooled into place to give concave shaped surfaces.

L. Wood shall be clean, dry and primed with a primer as recommended by the manufacturer of compound to be used.

M. Metal and glass shall be dry, free of oil, grease and dirt. Immediately before sealing with compounds, wipe surfaces to be filled with clean rags soaked in either methylethyl ketone, high flash naptha, lacquer solvents, or 50-50 alcohol and water, as appropriate, and wiped dry with a clean cloth.

N. Seal all interior wood trim and metal surfaces which bear or abut on masonry surfaces and all corners where wood and metal adjoins masonry surfaces. Seal all joints between concrete and masonry surfaces. Masonry joints shall be dry, wire brushed, free of dirt, grease or oil and primed with a primer, recommended by the manufacturer of compound to be used.

O. If primer used will produce yellowing, discoloration, or dirt pickup when applied on substrates, surfaces adjacent to joint shall be protected from such contamination by use of masking. Care shall be taken to remove masking tape before permanent adhesion takes place.

P. All exterior wall mounted fixtures shall be caulked at top and both sides of the fixture or mounting plate. All conduits that penetrate exterior wall shall be sealed and junction boxes shall be sealed at the perimeter of the box prior to setting fixture.

3.5 CLEANING

A. The surfaces of all materials adjacent to caulking and sealing operations shall be cleaned of any smears of compound or other soiling due to the caulking and sealing application. Fresh compound that has been smeared on adjacent surfaces shall be removed immediately and rubbed clean with non-staining solvent.

3.6 MATERIALS AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and replaced with new material in the best workmanlike manner at no extra cost to the Owner.

END OF SECTION 07900

SECTION 08100 - METAL DOORS AND FRAMES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Furnish all labor, materials, tools, equipment, etc. and services necessary and incidental to the complete fabrication, furnishing and erection of this Section as shown, noted, detailed and reasonably implied on the drawings and in the specifications.

1.3 RELATED SECTIONS

A. Coordinate work of this Section with work of other Sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other Sections, including:

1. Section 04810 – “Unit Masonry Assemblies.”
2. Section 07900 – “Joint Sealers.”
3. Section 08710 – “Door Hardware.”
4. Section 09911 – “Exterior Painting.”
5. Section 09912 – “Interior Painting.”

1.4 SHOP DRAWINGS AND SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300 – Shop Drawings, Product Data and Samples.

B. Provide a schedule of doors and frames using same reference numbers for openings and details as those on Contract Document. Indicate coordination of glazing frames and stops with glass and glazing requirements.

C. Show dimensioned door and frame elevations, locations, jamb conditions, methods of assembling, hardware preparation, label compliance, sound ratings, finishes, and anchorage details.

D. Submit manufacturer's printed literature on all doors frames, louvers and transoms including State of Florida-NOA product approval data sheets, demonstrating performance for all wind load conditions and pressures, outlined per the Structural Drawings. Product Data: For each type of sliding automatic entrance door indicated.

E. Submit test reports per Article 1.7, this Section.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Section 01600 – Materials and Equipment and Section 01620 – Storage and Protection.

B. Doors and frames shall be stored per manufacturer's instructions.

C. All doors shall be individually packaged in cartons completely covering entire door to prevent damage or marring of the finish.

D. Store doors and frames at building site under cover. Place units on minimum 4 inch high wood blocking. Avoid use of non-vented plastic or canvas coverings which could create humidity chamber. Provide ¼ inch spaces between staked doors to promote air circulation.

1.6 WARRANTY

A. Hollow metal doors shall be warranted by the manufacturer for a period of one (1) year against delamination, a lifetime warranty on rust perforation, and a one (1) year warranty from defects in materials and workmanship starting from date of substantial completion. See Section 01770 - Closeout Procedures, Detail Requirements.

1.7 TEST REPORTS AND COMPLIANCE

A. Flush Face Exterior Doors:

1. Acoustical qualities of 1-3/4 inch Doors shall be a minimum sound transmission classification of 26 as tested under ASTM E90. The urethane foam core shall have a "U" factor of 0.067 and "R" factor 14.8

2. Shall meet ANSI A151.1 performance test acceptance criteria for physical endurance; Level "A' (Class A) one million cycles; S.D.I. 100 classification Grade 2, Heavy Duty; Model 4.

B. Underwriter's Laboratories, Factory Mutual and Warnock Hersey labeled fire doors and frames:

1. ALL labeled fire doors and frames shall be of a type which has been investigated and tested in accordance with UL 10(b), ASTM E152, NFPA 252, ANSI A2.2 and, when required, UL 305.

2. A physical label shall be affixed to the fire door and fire door frame at an authorized facility as evidence of compliance with procedures of the labeling agency.

3. Labeled doors shown on the drawings shall meet the requirements of Underwriter's Laboratories, Inc., for Class of construction and shall bear their approval label, as one of the following.

a. 3 hour.

b. 1-1/2 hour.

c. 1 hour.

d. 3/4 hour.

e. 20 minute.

C. EXTERIOR OPENINGS: Exterior doors shall comply with wind load criteria specified per the latest version of the FBC. Door material gauges and reinforcement criteria specified here are minimum criteria. Door assemblies shall resist the cyclic pressures, static pressures and missile impact loads as detailed in Florida Building Code test protocols TAS 201, TAS 202, and TAS 203. Subject to compliance with requirements, and complete assembly testing for the Florida Building Code wind load requirements, manufacturers not listed below, offering products that may be incorporated into the work, are subject to the Architect's approval prior to award of the contract.

PART 2 – PRODUCTS

2.1 METAL DOORS (HM-1)

A. General: Refer to Door Schedule on the Drawings for door profiles.

B. Metal doors, Type "A" or Class I heavy duty, flush face as manufactured by Baron Metal Industries Inc. Equivalent products manufactured by CECO Corp., Curries, S.W. Fleming Ltd., Steelcraft Manufacturing, Republic Builders Products, Mesker Door, Inc., or Daybar are acceptable.

2.2 CONSTRUCTION

A. Exterior flush face doors shall be of composite construction, fabricated of two (2) level 2, heavy duty, 18 gauge seamless steel sheets from roller leveled prime quality cold-rolled steel for interior areas and roller leveled prime quality hot dipped galvanized or A60 galvannealed steel sheets for exterior areas. Interior doors to be 20 gauge, A60 galvannealed with mechanically interlocking seams on door edges only. Gauge of steel sheets may be required to be 16 gauge at exterior doors to resist higher wind pressures and dependent on door manufacturer’s standards and the structural capacity of the door dipped galvanized or A60 galvannealed steel sheets for exterior areas, with fully welded seams. Interior doors to be 20 gauge, A60 galvannealed with mechanically interlocking seams on door edges only.

B. Doors shall be accurately mortised, reinforced, drilled and tapped for finish hardware. Reinforcement plates for hardware shall be welded to door assembly and be of sufficient size to develop the door strength.

C. Top and bottom of the doors shall be closed flush by 16 gauge steel channels unless recessed automatic door bottoms are required. See Section 08710 – Finish Hardware.

D. Minimum gauges for hardware reinforcing plates shall be as follows:

1. Hinges and pivots - 7 gauge W.C.G. steel, prepared for 1 1/2 pairs of standard weight 4" hinges.

2. Lock face, flush bolts, concealed holders, concealed or surface-mounted closers - 12 gauge.

3. All other surface-mounted hardware - 16 gauge.

4. Hardware templates will be furnished by hardware supplier (Refer to Section 08710 – Finish Hardware).

E. After all welds and joints are ground smooth, the doors shall be thoroughly cleaned, given a coat of baked-on primer, all irregularities filled and made flush and then given a final coat of baked-on primer, interior doors 0.7 mils DFT and exterior doors 1.4 mils DFT. Exterior means doors exposed to outside air atmosphere, or non-conditioned spaces.

F. Core insulation:

1. Exterior doors shall have rigid urethane or polystyrene core foamed-in-place, or honey combed core, chemically bonded to all interior surfaces of face sheets; core shall be provided per door manufacture’s requirements to comply with the FBC windload requirements and thermal (“R” value) requirements at doors that are contigous to conditioned spaces, as shown on the Drawings or specified, or scheduled.

2. Interior doors shall have pre-expanded honeycomb core bonded to all interior surfaces of face.

G. Exterior Doors: Provide weatherstripping (3 sides). In addition, these doors shall include a threshold with recessed channel to receive automatic door bottom when scheduled. Refer to Section 08710 – Finish Hardware.

1. Maximum air infiltration shall be 1.25 cfm per square foot of door area.

2. Frames shall be prepared to accommodate automatic door bottoms when this hardware is scheduled or required.

2.3 DOORS SWINGING IN PAIRS

A. Doors shall have two-piece overlapping astragals which consist of an 18 gauge steel edge channel applied to inactive leaf and applied to the active leaf an extruded aluminum overlap strip with wool pile insert. All metal parts painted to match the doors.

B. Pair of labeled fire doors shall have two-piece overlapping astragals consisting of 16 gauge steel edge channel applied to inactive door and 12 gauge steel overlap strip applied to active leaf in accordance with procedures of labeling agencies.

C. Refer to Finish Hardware Schedule, Section 08710 – Finish Hardware, for meeting stiles and additional astragals.

2.4 METAL FRAMES

A. Metal frames shall be of the combination type with the trim and stops formed as an integral part of the frame. Profiles shall be press brake-formed true and sharp with head and jambs accurately mitered, continuously welded and ground smooth (welding type T-3). Frames shall have proper concealed anchors as required for each wall material.

B. Frames shall be 16 gauge hot-dipped galvanized steel with following anchors as required: Note that metal frames coated with S. W. Fleming Ltd.'s "paintable Galvanneal coating" satisfies the hot-dipped galvanized requirement.

1. Each jamb installed adjacent to masonry shall have one 16 gauge hot-dipped galvanized steel "T" anchor for each 24 inches of the jamb height, 3 min. per jamb.

2. Each jamb installed in existing concrete walls shall use expansion anchors, minimum of 3 per jamb.

3. Each jamb installed in drywall openings shall have a minimum of 3 adjustable drywall stud anchors per jamb.

4. Welded "Z" clips per manufacturers recommendations for specific installation requirements.

5. All door jambs shall rest on building floor slab construction and shall have 12 gauge floor angles welded to jambs for floor anchorage.

6. All door frame assemblies shall have removable steel spreaders welded to the bottom of the jambs to assure alignment.

C. Frames shall be accurately mortised, reinforced, drilled and tapped for finish hardware. Reinforcing for hardware shall be welded at the frame assembly. Closure bracket reinforcement, plaster guards, hinge reinforcements and reinforcement for all other surface applied hardware to be manufacturer's standard. Dust covers shall be welded over all punched openings and reinforcements to prevent clogging of tapped holes or openings.

D. After all welds and joints are ground smooth, the doors shall be thoroughly cleaned, given a coat of baked-on primer, all irregularities filled and made flush and then given a final coat of baked-on primer, interior doors 0.7 mils DFT and exterior doors 1.4 mils DFT. Exterior means doors exposed to exterior elements, including but not limited to salt air atmosphere.

E. Punch lock side of stop for single doors at 3 points and at 2 points on stop at head section of pairs of doors to receive door silencers.

F. Frames for labeled doors shall meet the requirements of Underwriters Laboratories, Inc., for Class of construction as indicated on schedule, and bear their approved label. See Article 1.7, Test Reports and Compliance.

G. After fabrication is completed, the frames shall be thoroughly cleaned,

bonderized and given a coat of baked on primer, interior frames 0.7 mils DFT and exterior frames 1.4 mils DFT.

H. KNOCK-DOWN TYPE FRAMES SHALL NOT BE PERMITTED!

I. Prepare frames to receive hardware as specified in Section 08710 – Finish Hardware.

2.5 LOUVERS AND FRAMES

A. Door louvers, where scheduled or shown shall be of the fixed slat type providing a minimum of 50% net free area. Louver blades shall be formed of 18 gauge steel and set in 16 gauge frames. Louvers for exterior openings shall have insect screens set in removable frames, mounted to the inside face of louver.

B. Panels above doors shall be of the same construction as door below panel.

2.6 PAINTING

A. Painting of hollow metal doors and frames shall comply with the following:

1. Door and Frame Schedules.

2. Section 09911 – Exterior Painting.

3. Section 09912 – Interior Painting.

4. Field apply bituminous paint to first 18 inches above finish floor of all exterior hollow metal door frames at interior/concealed surfaces of the door frame.

B. Colors of doors and frames shall be approved and selected by the Architect and Owner.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

A. All work shall be shop fabricated by experienced, qualified mechanics of this trade, to required profiles by forming and welding with corners, angles and edges straight and sharp.

B. Fit and fabricate accurately with corners, joints, seams and surfaces free from warp, wave buckle or other defects.

3.2 INSTALLATION

A. All metal doors and frame shall be installed true, level and plumb and in the best workmanlike manner of this trade. After wall construction is complete, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

B. All door hardware shall be installed in strict accordance with the manufacturer's printed instructions and free of all defects.

C. At masonry walls, frames shall be braced until wall in which frame is installed is complete.

D. Frames to be installed in masonry walls shall be set prior to starting masonry work. Anchors shall be installed in jambs and in masonry joints, the area between the masonry and jamb shall be filled solid with mortar. Frame installation shall comply with provisions of SDI-105 “Recommended Erection Instructions For Steel Frames”, and as specified herein.

E. Templates for all hardware items shall be coordinated with hardware suppliers.

F. Install fire rated frames according to NFPA 80 and fire rated doors with clearances specified in NFPA 80. Fit doors accurately in frames, within clearances specified in ANSI/SDI-100.

G. Provide a minimum of three anchors per jamb, adjacent to the hinge location on the hinge jamb, and at corresponding heights on strike jamb.

H. Prime coat touch up immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up coating of compatible air drying primer.

3.3 MATERIAL AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and be replaced with new material in the best workmanlike manner at no extra cost to the Owner.

B. Check and re-adjust operating hardware items, leaving steel doors and frames undamaged and in complete and proper operating condition.

END OF SECTION 08100

SECTION 08212 - STILE AND RAIL DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Interior stile and rail doors.
2. Interior fire-rated, stile and rail doors.
3. Finishing stile and rail doors.
4. Fitting stile and rail doors to frames and machining for hardware.

B. Related Sections:
1. Division 6 Section "Interior Architectural Woodwork" for requirements for veneers from the same flitches for both architectural woodwork and stile and rail wood doors.
2. Division 8 Section “Interior Glazing“ for glass doors.

1.3 REFERENCES

A. ASTM D-1037 –91 American Society for Testing and Materials: Standard Methods for Evaluating the Properties of Wood-Based Fiber and Particle Board Panel Materials.

B. ANSI A208.1 – Urea-formaldehyde Emissions.

C. ASTM E 152-81a – Standard Methods of Fire Tests of Door Assemblies.

D. WDMA I.S.6-A-99 - Window and Door Manufacturers Association.

E. Architectural Woodwork Standards, latest edition, published jointly by the Architectural Woodwork Institute, the Architectural Woodwork Manufacturer Association of Canada, and the Woodwork Institute.

F. NFPA 80 – Fire Doors and Windows.

G. FPA 252 – Standard Methods of Fire Tests for fire Door Assemblies.

H. FBC. – Latest edition adopted by authority having jurisdiction.

I. Fire Tests of Door Assemblies as enforced by the local Authority Having Jurisdiction (AHJ).

J. ITS – Certification Listings for Fire Doors.

K. Both FBC and National ADA.Codes – latest edition.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1. Include details of construction and glazing.
2. Include factory finishing specifications.

B. Shop Drawings: For stile and rail wood doors. Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data, including those for stiles, rails, panels, and moldings (sticking); and other pertinent data, including the following:

1. Dimensions of doors for factory fitting.
2. Locations and dimensions of mortises and holes for hardware.
3. Requirements for veneer matching.
4. Doors to be factory finished, and finish requirements.
5. Details of sound-control seals, door bottoms, and thresholds (where sound rated doors are indicated on Drawings or scheduled).
6. Fire ratings for fire-rated doors.

a. Neutral Pressure – UL10-B or,
b. Positive Pressure – UL10-C.

C. Samples for Initial Selection: For factory-finished doors.

D. Samples for Verification: Corner sections of doors, approximately 12 by 12 inches, with door faces and edgings representing typical range of color and grain for each species of veneer and solid lumber required. Finish Sample, approximately 6 by 6 inches with same materials proposed for factory-finished doors.

E. Schedule: Provide a schedule of sound-control door assemblies prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with the Door Hardware Schedule.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified acoustical testing agency.

B. Product Certificates: For each type of door, from manufacturer.

C. Warranty: Sample of special warranty.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Acoustical Testing Agency Qualifications: An independent agency accredited as an acoustical laboratory according to the National Voluntary Laboratory Accreditation Program of NIST.

C. Source Limitations: Obtain stile and rail doors from single manufacturer. Paint grade and stain grade doors to have matching architectural details, profiles, and dimensions.

D. Source Limitations: Provide custom stile and rail wood doors scheduled to be stained to match the Architect’s sample and finished in same shop as work in Division 6 Section 06202 Interior Finish Carpentry.

E. Sound Rating: Provide sound-control door assemblies identical to those of assemblies tested as sound-retardant units by an acoustical testing agency, and have the following minimum rating:
   1. See the Sound-Control Door Assemblies Table at the end of the Evaluations for a list of manufacturers' products according to door material (steel or wood) and STC rating. Higher ratings may require doors that are thicker than 1-3/4 inches (44 mm). Verify with manufacturer.
   2. STC Rating: Rating of 34 as determined by ASTM E 413 when tested in an operable condition according to ASTM E 90 and ASTM E 1408.

F. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL 10B.

   1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 250 deg F above ambient after 30 minutes of standard fire-test exposure.

G. Safety Glass: Provide products complying with testing requirements in 16 CFR 1201, for Category II materials, unless those of Category I are expressly indicated and permitted.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's written instructions and requirements of quality standard referenced in Part 2.

B. Doors & frames shall be stored on a flat and level surface in a well ventilated dry building. Doors shall not be stored on edge and shall be protected from dirt, water and abuse.

C. Package doors individually in opaque plastic bags or cardboard cartons.

D. Protect doors & frames from exposure to light for veneers which are light sensitive.

E. Doors & frames shall not be subjected to extreme heat or humidity. HVAC systems should be set to provide a temperature range of 60 – 90 degrees F and 25-55% relative humidity.

F. Handle doors and frames with clean hands or gloves. Do not drag doors across floors or other surfaces.

G. Mark each door and frame on top and bottom edge with opening number used on Shop Drawings.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and permanent or temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period in accordance with mfg. requirements.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship, or have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
2. Warranty shall be in effect during the following period of time from date of Substantial Completion:
   a. Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Use only materials that comply with referenced standards and other requirements specified.

1. Assemble interior doors, frames, and sidelites (where scheduled), including components, with either dry-use or wet-use adhesives complying with ASTM D 5572 for finger joints and with ASTM D 5751 for joints other than finger joints.

B. Certified Wood: Fabricate doors with all wood products produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

C. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea-formaldehyde resins.

D. Low-Emitting Materials: Fabricate doors with coatings, adhesives and composite wood products that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Panel Products: Any of the following:

1. Medium-density fiberboard made from wood fiber, with binder containing no urea-formaldehyde resin, complying with ANSI A208.2, Grade 130. Panels shall be compressed to a density of 48 pounds per cubic foot in a hot press by a process in which the added binder creates the entire inter-fiber bond.
2. Hardboard, complying with AHA A135.4.
3. Veneer core plywood, made with adhesive containing no urea-formaldehyde resin.

2.2 INTERIOR STILE AND RAIL DOORS

A. Interior Stile and Rail MDF Doors (Painted): Stock interior doors complying with AWI's "Architectural Woodwork Quality Standards,"AWI's "Manual of Millwork," WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors," and with other requirements specified.

1. Basis-of-Design Product: Subject to compliance with requirements, provide TruStile Doors, LLC; TS3300 & TS1000 (Glass Panel) MDF Doors or comparable product by one of the following:

   a. Harring Doors.
   b. Ideal Architectural Doors & Plywood.
   c. Maiman Company (The).
   d. Marshfield Door Systems, Inc.

2. Panel Designs: Indicated by Drawings. Do not modify intended aesthetic effects, as judged solely by Architect and Owner, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
3. Grade: Custom.
4. Finish: Factory Primed with low VOC, water based primer.
5. Louver Type: Where indicated on Drawings, vented with inverted “V” type louver blades.

6. Door Construction:

a. Stile and Rail Construction: Medium-density fiberboard core material with manufacturer's standard hardwood edge system for improved screw holding to extend the entire height of door.
b. Panel Construction: Shaped, medium-density fiberboard.

1) Panel Type: As selected by Architect and Owner from manufacturer's full range.

7. Stile and Rail Widths: Manufacturer's standard, but not less than the following:

a. Stiles, Top and Intermediate Rails: 4-1/2 inches.
b. Bottom Rails: 10 inches.

8. Raised-Panel Thickness: Manufacturer's standard, but not less than thickness required to comply with specified standards.
9. Flat-Panel Thickness: Manufacturer's standard, but not less than thickness required to comply with specified standards.
10. Molding Profile (Sticking): Recessed square or as selected by Architect and Owner from manufacturer's full range.
11. Glass: Uncoated, clear, fully tempered float glass, 5.0 mm thick, complying with Division 8 Section "Interior Glazing."

B. Interior Stile and Rail Veneer Doors (Stained): Stock interior doors complying with AWI's "Architectural Woodwork Quality Standards,"AWI's "Manual of Millwork," WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors," and with other requirements specified. Refer to door schedule for stained doors.

1. Basis-of-Design Product: Subject to compliance with requirements, provide TruStile Doors, LLC; TS3300 & TS1000 (Glass Panel) Doors or comparable product by one of the following:

a. Harring Doors.
b. Ideal Architectural Doors & Plywood.
c. Maiman Company (The).
d. Marshfield DoorSystems, Inc.
e. Woodharbor.

2. Panel Designs: Indicated by Drawings. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's and Owner's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
3. Grade: Custom.
4. Finish: Transparent or Opaque as scheduled, to match Architect's sample.
5. Louver Type: Where indicated on Drawings, vented with inverted "V" type louver blades.
6. Wood Species and Cut for Transparent Finish: "A" grade plain sliced White Oak – Color to match Architect's control sample; Grey Mist
7. Door Construction:

a. Stile and Rail Construction: Core material to be constructed of engineered wood to resist moisture, warping, checking and improved screw pull. Stiles are to be constructed for improved screw holding by use of solid wood edges. Hardwood stiles to match face veneers.
b. Panel Construction: Medium-density fiberboard core with solid wood panels laminated both sides or solid wood to match profile specified.

1) Panel Type: As selected by Architect and Owner from manufacturer’s full range.

8. Stile and Rail Widths: Manufacturer's standard, but not less than the following:

a. Stiles, Top and Intermediate Rails: 4-1/2 inches.
b. Bottom Rails: 10 inches.

9. Raised-Panel Thickness: Manufacturer's standard, but not less than thickness required to comply with specified standards.
10. Flat-Panel Thickness: Manufacturer's standard, but not less than thickness required to comply with specified standards.
11. Molding Profile (Sticking): Recessed square or as selected by Architect from manufacturer's full range.
12. Glass: Uncoated, clear, fully tempered float glass, 5.0 mm thick, complying with Division 8 Section "Interior Glazing."
13. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
14. Provide WI-Certified Compliance Certificate indicating that doors comply with requirements of grades specified.
15. Mark, label, or otherwise identify stile and rail wood doors as complying with WDMA I.S.6A and grade specified.
16. Provide match wood astrgals at pairs of wood doors, to match the door vendor.

C. Interior Stile and Rail Fire-RatedDoors: Fire-rated (20 -minute rating as scheduled) doors complying with AWI's "Architectural Woodwork Quality Standards," AWI's "Manual of Millwork," and with other requirements specified.

1. Fire doors to be Category A with concealed intumescent strips where positive pressure is required by code.
2. Panel Designs: To match MDF / Veneer Stile and Rail doors in every detail.
3. Grade: Custom.
4. Finish: Transparent or Opaque as scheduled.
5. Wood Species and Cut for Transparent Finish: To match Veneer Stile and Rail doors in every detail.
6. Door Construction: Core material shall allow panel profiles to match non rated doors.
7. Edge Construction: Stiles to be constructed for improved screw holding by use of manufacturer’s standard hardwood edge system to extend the entire height of door. Softwoods are not allowed.
8. Stile and Rail Widths: To match MDF / Veneer Stile and Rail doors in every detail

9. Molding Profile (Sticking): Recessed square or as selected by Architect from manufacturer's full range.
10. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
11. Provide WI-Certified Compliance Certificate indicating that doors comply with requirements of grades specified.

2.3 SOUND-CONTROL PANELS

A. Provide sound-control panels of same materials, construction, sound rating, and finish as specified for adjoining sound-control doors.

2.4 SOUND-CONTROL HARDWARE

A. Description: Provide manufacturer's standard sound-control system, including head and jamb seals, door bottoms, hinges, and thresholds, as required by testing to achieve STC and fire rating indicated.

B. Auto door bottoms shall be fully mortised type at public spaces.

2.5 STILE AND RAIL MDF DOOR FABRICATION

A. Fabricate stile and rail MDF doors in sizes indicated for field fitting.

B. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels unless otherwise indicated:

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/2 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide not more than 3/8 inch from bottom of door to top of threshold or finish floor.

    a. Comply with NFPA 80 for fire-rated doors.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
3. Bevel fire-rated doors 1/8 inch in 2 inches on lock edge; trim stiles and rails only to extent permitted by labeling agency.

C. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W Series standards, and hardware templates.

1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.

D. Glazed Openings: Trim openings indicated for glazing with solid wood moldings, with one side removable. Miter wood moldings at corner joints.

E. Glazed Openings: Glaze doors at factory with glass of type and thickness indicated, complying with Division 8 Section "Glazing." Install glass using manufacturer's standard elastomeric glazing sealant complying with ASTM C 920. Secure glass in place with removable wood moldings. Miter wood moldings at corner joints.

F. Transom and Side Panels: Fabricate panels to match adjoining doors in materials, finish, and quality of construction.

G. Provide hardware that complies with Division 8 Section "Door Hardware."

2.6 SHOP PRIMING

A. Doors for Opaque Finish: Shop prime doors with low VOC water based primer. Seal all four edges, edges of cutouts, and mortises with primer. Refer to Door Schedule.

B. Doors for Transparent Finish: Shop prime doors with stain (if required) and other required pretreatments. Seal all four edges, edges of cutouts, and mortises with first coat of finish. Refer to Door Schedule.

2.7 FINISHING

A. Prime paint MDF stile and rail doors at factory, scheduled to receive opaque finish.

1. Color: As selected by Architect and Owner from manufacturer’s full range.

B. For Veneer stile and rail doors indicated to be factory finished, comply with AWI's "Architectural Woodwork Quality Standards," WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors," and with other requirements specified.

1. Finish faces and all four edges of doors, including mortises and cutouts. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises; however surfaces not stained shall be sealed.

2. Color and sheen to match Architect’s control sample.

C. Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Transparent Finish:

1. Grade: Custom.
2. Finish: AWI catalyzed polyurethane finish system.
3. Staining: Match Architect's approved sample.
4. Effect: Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores.
5. Sheen: Satin.

E. Opaque Finish:

1. Grade: Custom.
2. Finish: AWI catalyzed polyurethane finish system.
3. Color: Match Architect's approved sample.
4. Sheen: Semigloss.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and substrates, with Installer present, for suitable conditions where wood stile and rail doors and fire-rated wood door frames will be installed.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install fire-rated wood door frames level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Countersink fasteners, fill surface flush, and sand smooth.

B. Hardware: For installation, see Division 8 Section "Door Hardware."

C. Install doors to comply with manufacturer's written instructions, WDMA I.S.6, "Industry Standard for Wood Stile and Rail Doors," AWI's "Architectural Woodwork Quality Standards," WI's "Manual of Millwork," WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors," and other requirements specified.

1. Provide WI-Certified Compliance Certificate for Installation.
2. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

D. Field-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/2 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 3/8 inch from bottom of door to top of threshold.

a. Comply with NFPA 80 for fire-rated doors.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
3. Bevel fire-rated doors 1/8 inch in 2 inches on lock edge; trim stiles and rails only to extent permitted by labeling agency.

E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

F. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

G. Sound-Control Seals: Where seals have been prefit and preinstalled in the factory and subsequently removed for shipping, reinstall seals and adjust according to manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

A. Testing Services: Acoustical testing and inspecting agency shall select one sound-control door(s) at random from sound-control door assemblies that are completely installed and perform testing for verification that assembly complies with STC rating requirements.

1. Field tests shall be conducted according to ASTM E 336, with results calculated according to ASTM E 413. Acceptable field STC values shall be within 5 dB of laboratory STC values.
2. Inspection Report: Acoustical testing agency shall submit report in writing to Architect and Contractor within 24 hours after testing.
3. If tested door fails, replace or rework all sound-control door assemblies to bring them into compliance at Contractor's expense.

a. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

B. Prepare test and inspection reports.

3.4 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08212

SECTION 08311 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Access doors and frames for walls and ceilings.

    a. Provide access doors as required in walls and gypsum wall board ceilings for access to equipment and operational controls, where removal for access of ceilings are not scheduled or shown on the Drawings.

B. Related Requirements:

1. Division 15 Section "Duct Accessories" for heating and air-conditioning duct access doors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, fire ratings, materials, individual components and profiles and finishes.

B. Shop Drawings

1. Include plans, elevations, sections, details, and attachments to other work.
2. Detail fabrication and installation of access doors and frames for each type of substrate.

C. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.

D. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics according to the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. NFPA 288 for fire-rated access door assemblies installed horizontally.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

A. Basis-of-Design Product:

1. Karp Associates, Inc.

2. Subject to compliance with requirements, provide product indicated or comparable product by one of the following:

a. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
b. Larsen's Manufacturing Company.
c. Milcor Inc.

B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.

2.3 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

C. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

D. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

E. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.

F. Aluminum Sheet: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than strength and durability properties of Alloy 5005-H15; with minimum sheet thickness according to ANSI H35.2.

G. Frame Anchors: Same type as door face.

H. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.4 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness. Paint to match adjacent surface in public areas.

C. Access Panel Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.

1. For concealed flanges with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded metal lath and exposed casing bead welded to perimeter of frames.
3. Provide mounting holes in frames for attachment of units to metal or wood framing.
4. Provide mounting holes in frame for attachment of masonry anchors.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

2.5 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Steel Finishes:

1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

2. Field paint to match adjacent surface or color selected by Architect if adjoining finish is not painted.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08311

SECTION 08336 – OVERHEAD COILING DOORS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Overhead coiling doors.

1.2 RELATED SECTIONS

A. Section 05500 - Metal Fabrications: Support framing and framed opening.

B. Section 06105 - Finish Carpentry: Pressure treated wood jambs.

C. Section 08710 - Door Hardware: Product Requirements for cylinder core and keys.

D. Section 09900 - Painting: Field applied finish.

1.3 REFERENCES

A. NFRC 102 - Test Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems.

B. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Element.

C. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

D. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

E. ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

F. ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

G. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

A. Overhead coiling non-insulated doors:
   1. Wind Loads: Design door assembly to withstand wind/suction load per the wind load drawings or as required by FBC without damage to door or assembly components in conformance with ASTM E 330.
   2. Operation: Design door assembly, including operator, to operate for not less than 20,000 cycles.

B. Single-Source Responsibility: Provide doors, tracks, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

C. Windborne: Provide overhead coiling doors that pass cyclic-pressure tests according to ASTM E 1996 for the wind zone for the building location, the requirements per FBC or as noted and scheduled.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Details of construction and fabrication.
   4. Installation instructions.
   5. FBC NOA product approval.

C. Shop Drawings: Include detailed plans, elevations, details of framing members, anchoring methods, required clearances, hardware, and accessories. Include relationship with adjacent construction.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.

F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

G. Operation and Maintenance Data: Submit lubrication requirements and frequency, and periodic adjustments required.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years’ experience in the fabrication and installation of security closures.

B. Installer Qualifications: Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by Architect.
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.

D. Closeout Submittals – Maintenance and warranty data.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

C. Store materials in a dry, warm, ventilated weathertight location.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 COORDINATION

A. Coordinate Work with other operations and installation of adjacent materials to avoid damage to installed materials.

1.10 WARRANTY

A. Warranty: Manufacturer’s limited door and operator system, except the counterbalance spring and finish, to be free from defects in materials and workmanship for 3 years or 20,000 cycles, whichever occurs first.
B. Warranty: Manufacturer’s limited door warranty for 2 years for all parts and components.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com.
E-mail: info@overheaddoor.com, or architect approved equal.

B. Subject to the compliance of the specified requirements a comparable product by one of the following manufacturers will be considered.
    a. Clopay.
    b. Cookson Company.
    c. Cornell Iron Works, Inc.
    d. Raynor.
    e. Wayne-Dalton Corp.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 OVERHEAD COILING SERVICE DOORS

A. Overhead Coiling Service Doors: Overhead Door Corporation Model 625.
    1. Curtain: Interlocking roll-formed slats as specified following. Endlocks shall be attached to each end of alternate slats to prevent lateral movement.
        a. Flat profile type F-265i for doors up to 40 feet (12.19 m) wide.
        b. Front slat fabricated of:
            1) 18 gauge galvanized steel.
        c. Back slat fabricated to match front slat
        d. Non-insulated door slats are acceptable

    2. Performance:
        a. Wind load resistance as specified, shown on the drawings or required by FBC.
    3. Finish:
        a. Galvanized Steel: Slats and hood galvanized in accordance with ASTM A 653 and receive rust-inhibitive, roll coating process, including 0.2 mils thick baked-on prime paint, and 0.6 mils thick baked-on polyester top coat.
            1) Powder coat: PowderGuard
                (a) PowderGuard Weathered Finish: Industrial textured powder coat provides a thicker, more scratch resistant coat. Applied to entire door system including slats, guides, bottom bar and head plate color as selected by the Architect.
            2) Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer.
    4. Weatherseals:
        a. Vinyl bottom seal, exterior guide and internal hood seals.
        b. Interior guide weatherseal.
        c. Lintel weatherseal.
    5. Bottom Bar:
        a. Two galvanized steel angles minimum thickness 1/8 inch (3 mm) bolted back to back to reinforce curtain in the guides.
    6. Guides: Three Structural steel angles
        a. Finish: PowderGuard Weathered finish with iron/black powder.
    7. Brackets:
        a. Galvanized steel to support counterbalance, curtain and hood.

8. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel, supporting the curtain with deflection limited to 0.03 inch per foot of span. Counterbalance is adjustable by means of an adjusting tension wheel.
9. Hood: Provide with internal hood baffle weatherseal.
    a. 24 gauge galvanized steel with intermediate supports as required.
10. Manual Operation:
    a. Chain hoist; endless steel hand chain, chain-pocket wheel and guard and gear-reduction unit with maximum 25 lbf force for door operation (reversible).
11. Electric Motor Operation: Provide UL listed electric operator, size as recommended by manufacturer to move door in either direction; provide alley-steel hand chain holder secured to operator guide at not less than 2/3 foot nor more than 1 foot per second; with controller (disconnect switch) for motor exposure indicated.
    a. Sensing Edge Protection:
        1) Pneumatic sensing edge.
        2) Electric sensing edge.
    b. Operator Controls:
        1) Push-button operated control stations with open, close, and stop buttons at interior.
        2) Key operation with open, close, and stop controls.
        3) Push-button and key operated control stations with open, close, and stop buttons at exterior.
        4) Controls surface mounted at interior.
        5) Controls flush mounted at exterior.
    c. Motor Exposure: Humid; interior.
    d. Comply with NFPA 70.
    e. Single phase 208 volts, Hertz 60
    f. Special Operation:
        1) Vehicle detector operation.
        2) Radio control operation.
        3) Card reader control.
        4) Photocell operation.
        5) Door timer operation.
        6) Commercial light package.
        7) Explosion and dust ignition proof control wiring.
    g. Motor Voltage: 115/230 single phase, 60 Hz.
12. Windload Design:
    a. FBC certification FL# to meet wind loading specified or shown on the drawings, and per FBC requirements.
13. Locking:
    a. Chain keeper locks for chain hoist operation.
    b. Interior slide bolt lock for electric operation with interlock switch.
    c. Cylinder lock, exterior only.
        1) cylinders specified in for electric operation with interlock
14. Wall Mounting Condition:
    a. Between jambs mounting.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify opening sizes, tolerances and conditions are acceptable.

B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.

F. Install perimeter trim and closures.

G. Instruct Owner’s personnel in proper operating procedures and maintenance schedule.

3.4 ADJUSTING

A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.

B. Adjust hardware and operating assemblies for smooth and noiseless operation.

C. Lubricate bearings and sliding parts as recommended by manufacturer.

D. Adjust seals to provide a tight fit around entire perimeter.

3.5 CLEANING

A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.

B. Remove labels and visible markings.

C. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 PROTECTION

A. Protect installed products until completion of project.

END OF SECTION 08336

SECTION 08342 – MOTOR OPERATED HYDRAULIC-SINGLE HANGAR DOOR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes individually motor operated “one piece” hydraulically operated hangar door and defines the nature and quality of required doors and their minimum standards of construction and operation.

B. Related Sections include the following:

1. Division 3 Section "Concrete" for concrete foundations, bottom rails, cross ties, and anchor-bolt installation.
2. Division 9 Section "Painting" for finishes, touch-up of shop coat, field welds and field bolts.
3. Division 8 Section “Steel Doors and Frames” for personnel doors and frames supplied by others to be installed in hangar doors.
4. Division 13 Section "Metal Building Systems" for metal siding panels, metal liner panels, jamb and corner trim, siding accessories, top guide supporting steel and bracing.
5. Division 16 Section "Electrical Basic Materials and Methods" for field wiring, conductors, conduit, boxes, exit lights and installation of trolley duct system.

1.3 DEFINITIONS

A. General: Hangar door for clear opening 100’-0” wide by 28’-0” high and consisting of a single leaf / panel hydraulically operated door system with hydraulic pistons at each jamb, flush mounted with exterior walls. Each door system to be complete with hinges pumps, heavy duty hydraulic cylinders wind load framing, operators, stops controls, hardware, flashing, trim top bottom truss, weather seal, etc., as required for a complete door assembly.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

General: The hangar door system shall be designed to the same requirements for live, dead end wind loads as the hangar building. The door shall be engineered to resist all anticipated loads without sagging, bowing or conflicting with its smooth and efficient

operation. Refer to the drawings for additional loading requirement. Door System Design Building Design and Contractor Coordination:

1. Pre-engineered hydraulically-operated-top-hinged-hangar-door system for a complete assembly.
2. The door manufacturer shall furnish for other trades all drawings and details for any structural steel, bracing, holes required that will be part of building construction performed under other Divisions of the specifications, required for proper installation of the door. Drilling of holes, cutting or any other work affecting the structural framing of the building shall be subject to approval of the metal building Engineer of Record.
3. Furnish all supervision, labor, materials, tools, equipment, and services required for fabrication and erection of the motor operated hangar doors in strict accordance with the specifications and applicable drawings.
4. The following standards and requirements shall be included and coordinated by the Contractor with the door manufacturer and metal building manufacture:

    a. ASTM A-36 structural steel framing and bracing for door.
    b. Full depth horizontal girting to accommodate the exterior preformed metal building siding and the interior preformed metal liner panel, full height of the doors.
    c. The building steel header design shall be coordinated with the hangar door manufacturer, and shall be designed to accommodate horizontal and vertical building deflections to support the “one piece” door in all positions, along with the proper lateral steel bracing.
    d. The building door jamb-steel-columns shall be framed and of the proper design and size to reinforce the opening and to carry all loads and vibrations imposed by the door to these structural members, along with the proper lateral steel bracing..
    e. Complete weather-stripping; including flexible-door-head wind curtain weathering.
    f. All required hardware for motor operation.
    g. Complete electrification system and supports.
    h. The Contractor shall furnish and install a prewired electrical door operating mechanism to control each “One Piece” hydraulic door. The Contractor is responsible and required to completely install the prewired electrical door operating mechanism, push button controls, devices and electrical conduit and wiring to the door operating controls. Control panel with 24volt up/down/off switch pre-wired to motor, and over-ride controls with the required number of adequately sized insulated electrical conductors.
    i. All electrical controls and devices shall conform to the requirements of the current National Electrical Code 513, NEMA, and be UL approved. Provide UL Listed Electric Operator, size and type as recommended by the manufacturer. The door operator shall be furnished complete by the door manufacturer and shall consist of a motor and factory-wired control panels consisting of main fused disconnect switch, magnetic reversing starters, limit switches and push button controls, control circuit transformer, relays, timing devices, and warning devices..

j. One coat of primer paint on all fabricated structural steel, and painted factory finished on all pre-assembled components. Refer to paint specifications for finish painting requirements.
k. Complete engineering drawings, calculations and required submittals sealed by the door manufacturer's registered professional engineer licensed in the State the door is to be installed at.
l. Door erection/installation.
m. Maintenance and operating manuals.
n. Guarantee of complete installation.

5. Design criteria: The door shall be designed and constructed in accordance with the latest American Institute of Steel Construction Specifications. They shall consist of standard structural sections of ample size and strength for the loads and stresses imposed under the specified conditions. Structural shapes and flat plates shall be in accordance with ASTM Designation A-36.

a. The door as a completed unit shall be designed to withstand the minimum external and/or internal wind load as indicated on the structural drawings under the Main Wind-force Resistant system provisions of the current edition of the Florida Building Code (FBC) and per ASCE 7-98.
b. The wind load deflection shall not exceed the door height in inches divided by 120.
c. The fiber stresses in the door members due to combine dead and wind loads shall not exceed 24,000 psi.

1.5 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of the following hangar door system components:

1. Structural-framing system and summary of forces and loads on walls and jambs and engineering signed and sealed drawings or Florida Product Approval (NOA).Electrical control system.
2. Electrical wiring diagram.
3. Door hydraulic pump units.
4. Accessories.
5. Setting drawings, template, and installation instructions for built-in or embedded anchor devices.

B. Shop Drawings: For the following hangar door system components shall include plans, elevations, sections, details, and attachments to other Work, as follows.

1. The door manufacturer shall submit for approval all design and shop drawings and complete calculations of all structural, mechanical, electrical and operational features of the doors, sealed by registered Professional Engineer licensed to practice in the State pf the project location. Field wiring diagrams, schematic wiring diagrams and physical location of electrical controls drawings shall be provided. The shop drawings shall name and list in detail the components used in and on the

doors, including the manufacturer's name, catalog number and a full description of the component.

2. Complete calculations shall be submitted with the shop drawings. Shop drawings submitted without these calculations will be returned marked "Revise and Resubmit".
3. Submit shop drawings for approval prior to fabrication. Include detailed plans, elevations, and details of framing members, required clearance, anchors and accessories. Include relationship with adjacent materials. The make and type of door, operators and controls shall be clearly shown. Door weight method of suspension, operation, and all fastenings shall be indicated.
4. Submit (four) copies each of the following manufacturer's Manuals / Diagrams
    a. "One Piece" Hydraulic Door Literature
    b. Installation Manual
    c. Operating Instructions
    d. Maintenance data / manual.
    e. Safety Decal Placement Guide Manual / Warning Labels
    f. Electrical System Manual for the "One Piece" Hydraulic Door system
        1) Electrical Schematics
        2) Electrical Wiring Diagram

    g. Diagrams of potentially hazardous locations related to the operation of the door.

5. Submit shop drawings specific for this project.
   NOTE: Generalized project drawings not specific to this project will not be acceptable.

C. Product Certificates: Signed by the manufacturer of hangar door systems certifying that products furnished comply with requirements.

D. Letter of Design Certification: Professional Engineer's certificate prepared and signed by a Professional Engineer, legally authorized to practice in the State where Project is located, verify that the structural framing meets the indicated loading and deflection requirements and codes of Authorities Having Jurisdiction. Include the following:

    a. Name and location of Project.
    b. Order number.
    c. Name of manufacturer.
    d. Name of Contractor.
    e. Door dimensions, including width and height.
    f. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
    g. Governing building code and year of edition.
    h. Design Loads: Include dead load, deflection, wind loads/speeds and exposure, seismic zone, or effective peak velocity-related acceleration/peak acceleration.

E. Manufacturer Certificates: Signed by manufacturers certifying that they comply with requirements. Include evidence of manufacturing experience.

F. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names, and addresses of architects and owners, and other information specified.

G. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Erector Qualifications: An experienced erector who has specialized in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.

B. Professional Engineer Qualifications: A professional engineer who is licensed and legally qualified to practice in the State where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of hangar door systems that are similar to those indicated for this Project in material, design, and extent.

C. Manufacturer Qualifications: A firm experienced in manufacturing hangar door systems similar to those indicated for this Project and with a record of successful in-service performance.

1. Doors and operating mechanisms shall be manufactured by a door manufacturer who has been continuously engaged in the design, manufacture, and installation of hydraulic aircraft hangar doors for over ten (10) years. The manufacturer will support with written evidence that they have designed, manufactured and installed a minimum of ten (10) motor operated door systems which have been in satisfactory operation for a minimum of three (3) years, with a minimum of ten (10) installations that are equal to or in excess of 20’-0” high.
2. Written evidence will include at least ten (10) hangar door installations of the hydraulic operated type, made by their company. Such list shall include name of installation, location, Owner, Architect, date installed and specific data as to size of doors, type of motors / pumps, safety devices, operating systems, , weather-stripping, etc. Written evidence shall list only door installations that have been designed, manufactured and installed by the submitting door manufacturer. The door manufacturer must certify that they will design and fabricate 90 percent or more of the door system by their personnel and in their facilities.
3. Engineering Responsibility: Preparation of Shop Drawings, testing program development, test result interpretation, and comprehensive engineering analysis by a qualified professional engineer.

D. Source Limitations: Obtain each type of the hangar door system component through one source from a single manufacturer.

E. Structural Steel: Comply with AISC S335, "Specification for Structural Steel Buildings--Allowable Stress Design, Plastic Design"; or AISC S342, "Load and Resistance Factor Design Specification for Structural Steel Buildings," for design requirements and allowable stresses.

F. Pre-Installation Conference: Schedule a pre-installation conference prior to commencement of field operations that might affect installation of the “One Piece” hydraulic door to establish procedures for maintaining optimum working conditions, and to coordinate this work with related and adjacent work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, panels, and other manufactured items so as not to be damaged or deformed. Package items as required for protection during transportation and handling. Deliver materials and products in manufacturer’s labeled protective packages.

B. Handling: Unload, store on timbers or pallets above ground level to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight and ventilated covering. Do not store material in contact with other materials that might cause staining, denting, or other surface damage.

D. Store and handle in strict compliance with manufacturer’s written instructions and recommendations. Protect from damage from weather, excessive temperatures, and constructions operations.

E. Inspect the “One Piece” hydraulic door upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to Architect. Otherwise, remove and replace damaged items as directed.

F. Place the “One Piece” hydraulic door frame units on a minimum of 4” high wood blocking. Store doors components & packages at building site under cover. Avoid use of non-vented plastic or canvas shelters which could create humidity chamber. If the cardboard wrapper on door becomes wet, remove carton immediately.

G. The Contractor shall store the sheet, panels, components, and other manufactured items so that they will not be damaged or deformed. Store metal sheets or panels so that any water accumulations will drain freely. Do not store sheets or panels in contact with other materials which might cause staining.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when weather conditions permit work to be performed according to manufacturer's written instructions and warranty requirements.

B. Field Measurements: Verify door opening by field measurements after the metal building has been erected and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions for Doors: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabrication of the door leaves without field measurements. Coordinate the door opening construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.9 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

1. Manufacturer's Warranty Period: Two years from date of Substantial Completion signed by the door manufacturer and installer.
2. Four (4) complete three ring binders containing instructions for proper operation and maintenance of the doors shall be furnished to the Owner. They shall contain complete:

    a. Operating instructions.
    b. Maintenance instructions.
    c. A chart showing all points to be lubricated, type of lubricant and frequency of lubrication.
    d. A chart giving a checklist of parts to be serviced and adjusted and the frequency of adjustment.
    e. A complete list of spare parts.
    f. A manufacturer's catalog for every component used in or on the doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: The basis of design shall be Schweis's "One Piece" hydraulic hangar door, P.O. Box 220, Fairfax, MN 55332, Phone (507) 426-8273, Fax (507) 426-7408. Subject to compliance with requirements, of these specifications products approved in writing by the Architect and the Owner will be accepted.

B. Manufacturer's seeking approval of the product shall comply with the product substitution requirements in Division 01, prior to receipt of the bids for the project.

2.2 STRUCTURAL MATERIALS

A. Structural-Steel Shapes: ASTM A 36.

B. Steel Plate, Bar, or Strip: ASTM A 36

C. Steel Tubing or Pipe: ASTM A 500, Grade B; ASTM A 501; or ASTM A 53, Grade B.

D. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.
2. Direct-Tension Indicators: ASTM F 959, Type 325, or Type 490
   a. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50, epoxy coated.

E. Primers: As selected by manufacturer for resistance to normal atmospheric corrosion, compatibility with finish paint systems, capability to provide a sound foundation for field-applied topcoats despite prolonged exposure, and as follows:

1. Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer; complying with performance requirements of FS TT-P-664.

2.3 MISCELLANEOUS MATERIALS

A. Finish Painting: Refer to Division 9 Section "Painting."

2.4 FABRICATION, GENERAL

A. Door Construction: Door members in sizes suitable for convenient shipping shall be bolted and/or welded construction. Joints shall develop 100 percent of the strength of the framing members. Vertical members shall be continuous throughout the height of the door. The sections and framing members of which they are composed shall be true to dimension and square in all directions and shall not be out of line more than 1/8 inch in 20 feet. Vertical and horizontal members adjacent to each other and/or being joined in the field shall be accurately prepared to facilitate field assembly. Full depth members spaced vertically shall be provided for proper lateral support of inside and outside flanges for all main members. Diagonal bracing shall be provided so that the completed leaf assembly will be adequately braced to withstand shipping, assembly, and operational loads.

1. Fabrication of door shall be done in jigs so as to hold the sections to specified tolerances. Exposed welds and welds, which interfere with the installation of various parts, such as exterior panels and liner panels, etc., shall be ground smooth.

2. The exterior door covering shall be pre-formed metal panels of the type and gauge, furnished and installed as specified in Division 13 “Metal Building Systems”.

3. Weathering: Material, which is adjustable and readily replaceable, shall be provided at all necessary vertical edges, head and sill to afford a substantially weather-tight installation.

4. Weathering shall be properly fitted and adjusted to close all openings. It shall be fitted at the factory, marked, and removed before shipment. Clearances between

metal parts on vertical edges of leaves and between leaves and jambs, which are to be weathered, shall not be less than three (3) inches.

5. Provide manufacturer's seal continuous at top, bottom of each door. The sides of the "One Piece" Hangar door shall be sealed off with a special weather stripping. The entire door perimeter must be weather tight.

6. The door shall be equipped with neoprene weather stripping at heads and jambs to prevent flow of moisture into the door installation. Sills shall have a special fabric reinforced high grade rubber astragal. The entire door perimeter shall be weather tight.

7. Hangar door shall be electrically operated "One Piece" hydraulic type and shall be integral with the hangar building design.

8. When in the open position the door shall have a slight slope to direct drainage away from the building.

9. Door shall be hinged horizontally at the top and be arranged to open by moving frame out & up.

10. Door frames shall have pre-located top hinges to align with the building truss and steel framing members.

11. Door shall be self-contained with only the top hinges; side column cylinders supports legs.

12. The door framework shall consist of jig welded steel tube sections engineered by the door manufacturer to resist all anticipated loads without staffing, bowing or conflicting with its smooth operation.

13. Structural steel door framing members shall be ASTM A500 Grade B square structural welded steel tubing.

14. Provide an integral steel safety truss and brace at the bottom leading-edge of the door exterior.

15. Furnish all labor, materials, accessories, equipment, and services necessary to furnish a complete installation of a "One Piece" hydraulic hangar door, as indicated by the manufacturer. Including frame, sections, brackets, guides and side column cylinders supports legs, hardware, operators and installation instructions.

B. Hardware: Hardware shall be designed and manufactured expressly for use on aircraft hangar doors. The door manufacturer shall provide top guide roller assemblies, and required hardware for operation of the door as part of the finished door.

1. The hangar doors shall not be equipped with locking devices, except as specified for personnel doors.

2. Rubber bumpers shall be provided on the leading and trailing edges at top and bottom as required preventing the door from coming in contact with the end walls or any other obstruction.

C. Metal Siding:

1. Install door skins to completely clad the door frames, use noncorrosive fasteners.

2. The hangar door covering shall meet the requirements as specified for the metal siding of the hangar and the exposed surface shall be colored to match the exterior siding of the hangar.

3. Install the door skin and all trims according to the “One Piece” door recommendations.

D. Shop Paint: Door framing members shall be thoroughly cleaned of loose scale, shavings, filings, dirt, dust, or other objectionable materials that would interfere with the bond of paint.

1. All shop painting shall be done in accordance with good practice for such work. No painting shall be done in freezing weather. All painting shall be done in dry weather or under cover and surfaces of steel shall be free from moisture when painted.

2. All metal surfaces shall be given a priming coat of rust inhibitive paint.

3. Special care shall be taken in painting mechanisms, limit switches, electrical controls, etc., so that paint is applied to finished or to bearing surfaces. Components supplied by other manufacturers having painted surfaces need not be painted.

E. Operating System: Operation of each door shall be by hydraulic cylinders with one at each door jamb.

F. Electrical Controls: The door manufacturer shall furnish the doors with the proper electrical equipment and controls, built in accordance with the latest NEMA Standards. All equipment, power and control circuits shall be installed in accordance with the National Electrical Code, Standard No. 70, and the requirements of Authority Having Jurisdiction. Any equipment located eighteen (18) inches or less above the floor shall be explosion proof.

1. Magnetic reversing starters shall be enclosed in a NEMA 12 enclosure with a three pole fused lockable disconnect in the cabinet door and shall be factory wired and equipped with overload and under voltage protection, mechanical and electrical interlocks, relays, timing devices and transformers for the control circuits. A wiring diagram shall be placed on the inside of each enclosure cover.

2. The door shall be controlled by a constant pressure 2-button push button station, mounted on accessible interior faces at each end as required for a safe operable condition. Removing pressure from the buttons shall stop the hydraulic pump and set the brakes. Controls shall not be reversible. All interior push buttons shall be in

NEMA 12 enclosures with mushroom head buttons. All exterior push buttons shall be in NEMA 4 enclosures with mushroom head buttons

3. Limit switches shall be provided to stop the travel of the door in their fully opened or fully closed position. The limit switched shall be positive acting snap action type with actuating cams designed with sufficient over travel to permit the group to come to a complete stop without over traveling the limit switches. The limit switches shall be mounted on the power leaf with actuating cams mounted on the top guides overhead.

4. Interlocks shall be provided at hollow metal personnel door where shown on the drawings, that are located within the hangar door. Interlock shall prevent motor operation of the hangar door group when the personnel door is open. Provide an indicator light at door control stations indicating when the personnel door is open.

5. A clearly audible signal shall be provided on each hangar door and shall operate when the push buttons are actuated for movement of the doors in either direction. The signal device shall be not less than a six (6) inch diameter bell or equivalent decibel rated horn loud enough to be clearly heard in the hangar and on the apron. The signal shall sound continuously when the door group is in motion.

6. Each control enclosure shall be completely shop wired and be provided with a numbered terminal strip for the convenience of the electrical contractor.

F. Hydraulic Gear Motor Pump:

1. The hydraulic gear Motor pump system must stop and hold door in any position of the door travel.

2. Provide high starting torque, reversible, continuous duty, class A insulated, electric motors complying with NEMA MG 1, with fused protection, sized to start, accelerated and operate door in either direction from any position.

3. A magnetic starter with 24v control unit for reliability is standard.

4. Design operator so motor may be removed without disturbing limit switch adjustment and without affecting emergency auxiliary operator.

G. Electrical Wiring and Source of Power: All flexible wire ducts, conduit and fittings, flexible multi-conductor cables, junction boxes, and all labor to wire and connect to and between all electrical equipment on the doors shall be installed in accordance with the door manufacturer’s approved wiring diagrams and drawings by the electrical contractor.

1. If permanent electrical power is not available when the doors are installed, the electrical contractor shall obtain a temporary source of electrical power so the doors may be tested and adjusted under power.

2. The door manufacturer's wiring diagrams shall include a complete schematic wiring diagram; a field wiring diagram; a complete physical location drawing showing the location of all controls with the runs of conduit, size of conduit, number and size of wires in each conduit, location of junction boxes and full details of control mountings.

3. Provide Electrical Disconnect to completely disable the door, for service, maintenance, emergency backup operations.

4. Mount disconnect so it is accessible from floor level.

2.5 WALL PANELS

A. Panels (exterior) shall be provided by the metal building manufacturer. Refer to Division 13 Section "Metal Building Systems" for metal siding panels, metal liner panels, jamb and corner trim, siding accessories, wall insulation, top guide supporting steel and bracing requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the hangar door system.

1. Prepare a written report, listing conditions detrimental to performance of work.

2. Proceed with erection only after unsatisfactory conditions have been corrected.

3. Examine wall and overhead areas, including opening framing and blocking with the door installer present for compliance with requirements for installation tolerance, clearances and other conditions affecting performance of Work of this section.

4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:

1. Door manufacturer is required to coordinate with the metal building manufacturer in the development of the exact installation details and provide weights and door loadings to building manufacturer.

2. Install door, cylinder columns and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers and equipment

supports according to Shop Drawing manufacturer's written instructions and as specified.

3. Fasten / Hang horizontal track, hinges from structural overhead framing with angle or channel hangers welded and/or bolt fastened in place. Fasten and hang vertical cylinder columns, from structural column framing with angle or channel hangers welded and / or bolt fastened in place. Provide sway bracing, diagonal bracing and reinforcement as required for rigid installation of track, hinges, and door-operating equipment.

B. Recommended Clear Opening

1. Each "One Piece" door has a recommended clear opening setting, specified by the manufacture. Do not over travel the door beyond the recommended setting.

C. Apply Proper Safety Markings

1. Apply Proper Markings for any potentially hazardous locations related to the operation of the door.

2. Follow the pictorial diagram included in the door installation manual.

D. Installing Warning Labels

1. Furnish warning labels for any potentially hazardous locations related to the operation of the door. Fasten warning labels to the "One Piece" hydraulic door frame and by the operator's station in accordance with manufacturer's instructions, NO EXCEPTION.

E. Installer Certificates:

1. Signed by manufacturer certifying that installers comply with specified requirements.

F. Installing Services: (Optional)

1. Install Representative, Manufacturer's representative to supervise assembly of door.

3.3 ERECTION

A. Erect metal building system according to manufacturer's written instructions and erection drawings.

B. Do not field cut, drill, or alter structural members without written approval from the hangar door manufacturer's professional engineer.

C. Hangar doors shall be erected when the hangar roof has been completed and is in its proper position under full dead load. When the hangar roof is completed and in position, the door guides shall be adjusted in relationship to the rails to the proper line, gauge, and elevation in accordance with the approved tolerances stated herein.

D. All hangar doors and accessories shall be assembled in strict accordance with the approved shop and erection drawings. The doors shall be installed **under the supervision of an authorized representative of the door manufacturer**, who shall be responsible for proper and satisfactory operation.

E. Align and adjust framing members before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Make adjustments to compensate for discrepancies in alignment.

3.4 WALL PANEL INSTALLATION

A. Exterior wall panels

1. Metal building erector to install the same exterior wall panels that are on the building for the siding use the same type on the “One Piece” hydraulic door. Install the proper trims that are recommended by the metal building manufacturer.

B. General: Provide panels full height as shown on building elevations, sections, and details. Install panels perpendicular to girts.

1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Install panels with vertical edges plumb. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
2. Unless otherwise indicated, begin panel installation at corners with center of rib lined up with line of framing.
3. Field cutting by torch is not permitted.
4. Align bottom of wall panels and fasten with blind rivets, bolts, or self-tapping screws.
5. Fasten trim and similar elements with self-tapping screws.
6. Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
7. Provide weather-resistant escutcheons for items penetrating wall panels and liner panels.
8. Use aluminum or stainless-steel fasteners for exterior applications and galvanized fasteners for interior applications.
9. Locate and space fastenings in true vertical and horizontal alignment.

C. Field-Assembled, Insulated Panels: Install wall panels on exterior side of doors. Attach panels to supports with fasteners as recommended by manufacturer. Install insulation and cover with liner panels.

D. Liner Panels: Install panels on interior side of doors at locations indicated. Fasten with exposed fasteners as recommended by manufacturer.

3.3 INSPECTION AND TESTING

A. Inspection of the hangar door installation will be made after erection is complete. Any defects disclosed by the test shall be corrected by the door manufacturer and the installation delivered in and acceptable operable condition.

3.4 CLEANING AND PROTECTION

A. Touchup Painting: Immediately after erection, clean, prepare, and prime or reprime welds, bolted connections, and abraded surfaces of prime-painted framing, accessories, and plates.

1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
2. Apply compatible primer of same type as shop primer used on adjacent surfaces.

END OF SECTION 08342

SECTION 08461 - SLIDING AUTOMATIC ENTRANCE DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes automatic entrance door systems with bi-parting sliding operation.

B. Ref. Division 8 Section “Aluminum Entrances, Storefront” for adjacent related work.

C. Ref. Division 8 Section "Door Hardware" for lock cylinders.

D. Ref. Division 8 Section "Glazing" for glazing requirements for automatic entrance doors.

E. Ref. Division 16 Sections for Electrical Requirements.

F. Ref. Appendix B – Owner furnished furniture, fixtures and equipment for access control devices.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide automatic entrance door systems that have the following capabilities based on testing manufacturer's standard units in assemblies similar to those indicated for this Project:

1. Operating Temperature Range: Door operators capable of operating between minus 10 deg F and plus 120 deg F.
2. Maximum Opening Force:

    a. Exterior Doors: 15 lbf.
    b. Interior Doors: 5 lbf.

1.4 SUBMITTALS

A. Product Data: For each type of sliding automatic entrance door indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, wiring diagrams, and attachments to other Work.

C. Hardware Schedule: Organize schedule into sets based on hardware specified. Include name of item and manufacturer, and complete designation of every item required for each automatic entrance door.

D. Submit shop drawings and product data under provisions of Section 01300 – Shop Drawings, Product Data and Samples.

E. Samples: For each exposed finish and for each color and texture required.

F. Product Certificates: Certifying that products furnished comply with emergency exit door requirements.

G. Maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer, approved by manufacturer to install and maintain manufacturer's products.

B. Manufacturer's Certificate: Issued by the American Association of Automatic Door Manufacturers.

C. Welding Standards: Comply with AWS D1.2, "Structural Welding Code--Aluminum."

D. ANSI/BHMA Standard: ANSI/BHMA A156.10, "Power Operated Pedestrian Doors."

E. UL Standard: Provide power door operators that comply with UL 325.

F. Emergency Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrance doors serving as a required means of egress.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturers agrees to repair or replace components of automatic entrance door system that fail in materials or workmanship, excessive air leakage, faulty operation of operators and hardware, or deterioration of metals, metal finishes, and other materials beyond normal weathering within three (3) years from date established in Specification Section 01770 “Closeout Procedures”.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Stanley Security Solutions, Inc.
2. Besam Inc.
3. Horton Automatics; Div. of Overhead Door Corporation.

C. The automatic door and glass shall be wind rated for an essential facility per FBC requirements.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated. Match finish of adjacent storefront.

1. Extruded: ASTM B 221.
2. Sheet and Plate: ASTM B 209.
3. Welding Rods and Bare Electrodes: AWS A5.10.

B. Glazing: As specified in Division 8 Section "Glazing" to be insulated and impact rated.

C. Sealants and Joint Fillers: Refer to Division 7 Section "Joint Sealants" for joints at perimeter of entrance system.

D. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, premixed, nonmetallic, noncorrosive, nonstaining grout; of consistency suitable for application.

E. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos; formulated for 30-mil thickness per coat.

2.3 AUTOMATIC ENTRANCE DOOR SYSTEM

A. General: Manufacturer's standard automatic entrance door system, complete with doors, sidelite and transom framing, operators, controls, activation devices, safety devices, and accessories as indicated.

1. Configuration: Bi-parting sliding doors, with sidelite on each side of door.

a. Traffic Pattern: Two-way.
b. Emergency Breakaway Capability
c. Mounting: Between jambs.

B. Activation Devices:

1. Infrared-scanner presence detector.
2. Security key pad and access control; the interior side of automatic doors heading to the secured – apron areas shall be accessed via a security keypad system and shall also be unlocked (or operated) from the FBO reception counter. A

security key pad shall also be provided at the exterior of the door for after hours access. Note that the security system access-control devices shall be provided by the owner.

C. Operator Safety Devices:

1. Photoelectric beams.

2.4 COMPONENTS

A. Doors: Manufacturer's 1-3/4-inch- thick glazed doors with minimum 0.125-inch-thick, extruded tubular stile and rail members impact rated glass for essential facilities. Fabricate corners with mechanically fastened reinforcing brackets or by welding. Incorporate concealed tie-rods that span full length of top and bottom rails and reinforcing for wind loading requirements.

1. Glazing Stops and Gaskets: Manufacturer's standard snap-on, extruded-aluminum, bevel glazing stops and preformed resilient glazing gaskets.
2. Stile Design: Medium stile.
3. Rail Design: 6-1/2-inch nominal height, 10 inch minimum at sill member.
4. Muntin Bars: Horizontal tubular rail member for each door; match stiles and rails.

B. Framing Members: Fabricate from extruded aluminum or formed-aluminum sheet or plate.

1. Main Extrusions: Minimum wall thickness of 0.125 inch.
2. Extruded Glazing Stops and Applied Trim: Minimum wall thickness of 0.062 inch.
3. Muntin Bars: Horizontal tubular rail members for sidelites; match stiles and rails.

C. Headers: Fabricated from minimum 0.125-inch thick, extruded aluminum or formed-aluminum sheet or plate. Conceal operator and roller track in header, providing access by means of hinged or removable access panel to permit service and adjustment. Secure panel to prevent unauthorized access.

1. Header Type: Concealed, fabricated to match depth of framing and to extend full width of door opening.

D. Carrier Assembly and Overhead Roller Track: Manufacturer's standard carrier assembly that allows vertical adjustment; consisting of nylon- or delrin-covered ball-bearing-center steel wheels operating on a continuous roller track, or ball-bearing-center steel wheels operating on a nylon- or delrin-covered continuous roller track. Support doors from carrier assembly by cantilever and pivot assembly.

1. Rollers: Minimum two ball-bearing roller wheels and two anti-rise rollers for each active leaf.

E. Sills: Manufacturer's standard sill members and bottom guide system, with stainless-steel ball-bearing-center roller wheels, and threshold and configuration indicated below:

1. Configuration: Saddle type threshold across door opening and pin-guide track system at sidelites.

F. Brackets and Reinforcements: Manufacturer's standard; compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components.

G. Fasteners and Accessories: Manufacturer's standard corrosion resistant, nonstaining, nonbleeding; compatible with adjacent materials.

1. Reinforcement: Reinforce members as required to retain fastener threads.
2. Exposed Fasteners: Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.

H. Signage: Comply with ANSI/BHMA A156.10.

2.5 DOOR OPERATORS

A. General: Of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.

1. Type: Power operated, complying with ANSI/BHMA A156.10.
2. Connections: For power and control wiring.
3. Adjustment Features: Fully adjustable without removing entrance doors, including adjustable speed, adjustable time delay for length of time door remains open, automatic door re-open if stopped while closing.
4. On/Off Feature: On/off/hold-open switch controls electric power to operator.

B. Electromechanical Operators: Self-contained overhead units, with power opening and closing mechanism, with checking in both opening and closing cycles, with safety-release clutch for obstructed closing, and that slides manually when power is off.

1. Closing Mechanism: Spring or Power operated.
2. Mounting: Concealed.

2.6 ACTIVATION AND SAFETY DEVICES

A. Infrared-Scanner Presence Detector: Self-contained, infrared-scanner presence-sensing device that activates door operator; that is adjustable to provide detection patterns and sensitivity equivalent to those required for control mats; and with metal or plastic housing in black finish.

2.7 HARDWARE

A. General: Refer to Division 8 Section "Door Hardware" for requirements for hardware items other than those indicated to be provided by automatic entrance door manufacturer.

B. Heavy-Duty Hardware: Provide units as indicated in size, number, and type recommended by manufacturer for entrances required. Finish exposed parts to match door finish, unless otherwise indicated.

C. Emergency Breakaway Hardware: Provide release hardware that allows panel to swing out in the direction of egress to a full 90 degrees from any position in the sliding mode with maximum force required to open panel of 50 lbf according to ANSI/BHMA A156.10. Interrupt operation of breakaway panel operator while in breakaway mode.

D. Deadlocks: Manufacturer's standard mortise hook bolt with 5-ply laminated steel, hook-shaped throw bolt, complying with ANSI/BHMA A156.5, Grade 1 requirements.

1. Cylinders: On door exterior, as specified in Division 8 Section "Door Hardware."
2. Two-Point Locking: Provide bottom bolt and mechanism that automatically throws active-leaf bottom bolt into threshold when deadlock engages inactive leaf and that provides one-stage unlocking.

E. Push Bars: As selected from manufacturer's full range.

F. Compression Weather Stripping: Manufacturer's standard replaceable, compressible gaskets of molded neoprene or molded PVC. Include bumper-type gaskets at door stops and laps.

G. Sliding Weather Stripping: Manufacturer's standard replaceable weather stripping of wool, polypropylene, or nylon woven pile, with nylon-fabric or aluminum-strip backing, complying with AAMA 701.

2.8 FABRICATION

A. Prefabrication: Complete automatic door fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.

1. Perform fabrication operations, including cutting, fitting, forming, drilling, and grinding of metalwork in manner that prevents damage to exposed finish surfaces. For hardware, perform these operations before applying finishes.
2. Prepare components to receive concealed fasteners and anchor and connection devices.

B. Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to GANA's "Glazing Manual."

D. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

E. Hardware: Install hardware, except surface-mounted hardware, at fabrication plant. Remove only as required for final finishing operation and for delivery to and installation at Project site.

F. Doors: Fabricate doors in profiles indicated. Reinforce as required to support imposed loads and for installing hardware. Factory assemble door and frame units.

1. Exterior Doors: Provide compression weather stripping at fixed stops. At locations without fixed stops, provide sliding weather stripping retained in adjustable strip mortised into door edge.

G. Framing: Fabricate tubular and channel frame assemblies in configuration indicated, with welded or mechanical joints according to manufacturer's standards. Provide subframes and reinforcement of types indicated or, if not indicated, as needed for a complete system to support required loads.

1. Exterior Framing: Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior. Provide anchorage and alignment brackets for concealed support of assembly from the building structure. Allow for thermal expansion of exterior units.

2.9 FINISHES

A. Aluminum High-Performance Organic Finish: Three-coat, thermocured system with fluoropolymer coats containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 605.2.

1. Color: To match aluminum entrances and window walls

PART 3 - EXECUTION

3.1 INSTALLATION

A. Templates and Diagrams: Furnish templates, diagrams, and other data to fabricators and installers of related work, as necessary for coordinating automatic entrance door installation.

B. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.

C. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact

concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

D. Entrances: Install entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place. Lubricate operating hardware and other moving parts.

1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
2. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

E. Door Operators: Install door operator system, including control wiring. Refer to Division 16 Sections and electrical drawings for connection to electrical power distribution system and security access control.

F. Activation and Safety Devices: Install control devices and wiring, including connections to door operators, as follows:

1. Infrared-Scanner Presence Detectors: Install scanners on both interior and exterior sides of each sliding automatic entrance door as indicated.

G. Glazing: Comply with installation requirements in Division 8 Section "Glazing."

H. Sealants: Comply with requirements in Division 7 Section "Joint Sealants" for installing sealants, fillers, and gaskets.

1. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction.
2. Seal frame perimeter with sealant to provide weathertight construction.

I. Adjusting: Adjust door operators, controls, and hardware for smooth and safe operation and for weathertight closure.

J. Security Access Control: Coordinate the interface and installation requirements for access control devices provided by the owner’s security contractor, and door operation requirements, (including wiring chase-ways/sleeves) and ensure proper operation of the door is achieved. The access control devices are to be located within the aluminum frame jambs of the door.

3.2 FIELD QUALITY CONTROL

A. Inspection: After completing installation, an inspector certified by the American Association of Automatic Door Manufacturers shall test and inspect each automatic entrance door for compliance with applicable ANSI/BHMA standards.

1. Inspection Report: Submit report in writing to Architect and Contractor within 24 hours after inspection.

B. Repair or remove and replace Work that does not comply with requirements.

3.3 DEMONSTRATION

A. Engage manufacturer's inspector certified by the American Association of Automatic Door Manufacturers to train Owner's maintenance personnel to adjust, operate, and maintain automatic entrance doors and operators. Refer to Division 1 Section "Closeout Procedures".

END OF SECTION 08461

SECTION 08710 – DOOR HARDWARE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Work covered by this Section of Specifications consists of furnishing and delivering to the jobsite for fitting and installation, all Finish Hardware complete, in accordance with this Section, applicable drawings, and contractor's shop drawings, and subject to the terms and conditions of the Contract. It is intended that the following list of hardware will cover all Finish Hardware to complete the project. Omissions and/or discrepancies shall be brought to the Architect's attention during the bidding period. THE HARDWARE PROVIDED WILL NEED TO MATCH THE AIRPORT'S "CAMPUS" STANDARD AND SHALL BE CONFIRMED BY THE CONTRACTOR PRIOR TO ORDERING MATERIAL. The electronic locks and panic devices will need to be compatible with the Airport's security system.

B. The Contractor shall employ a DHI-certified Architectural Hardware Consultant who shall review the enclosed schedule and provide a detailed hardware submittal based on the Drawings and Specification requirements, and provisions for operation of the doors for this Project.

C. Furnish and install construction temporary hardware as required by the Contractor to secure finished units until accepted by the Owner.

D. Fire-rated openings:

1. Provide hardware for fire-rated openings in compliance with A.I.A. (NBFU) Pamphlet No. 80, NFPA Standards NO. 101, FBC-Latest Edition and UL10C. This requirement takes precedence over other requirements for such hardware. Provide only hardware that has been tested and listed by UL for the types and sizes of doors required and complies with the requirements of the door and door frame labels.

2. Where panic exit devices are required on fire-rated doors, provide supplementary marking on door UL label indicating Fire Door to be equipped with fire exit hardware and provide UL label on exit device indicating "Fire Exit Hardware". All exit doors accessing the SIDA area (Apron) shall be equipped with delayed egress panic devices and the Contractor shall coordinate all electrified hardware with the fire alarm, the Airport's security and access control system and verify compatibility and function of the door hardware.

1.2 ITEMS SPECIFIED IN OTHER SECTIONS

A. Hardware for the following items is specified as a part of the items in their respective Specification Sections or in the Base Building Specifications.

1. Glass and Glazing-Section.
2. Automatic Doors
3. Folding partitions
4. Rough Carpentry.
5. Access Panels.
6. Division 16 for Electrical, Fire Alarm interface, and access control requirements.

1.3 SUPPLIER

A. Finish Hardware shall be furnished by a hardware contractor/supplier approved by the Architect as having appropriate technical knowledge and experience to correctly interpret drawings and specifications. Supplier shall be prepared at all times during the progress of installation to promptly provide competent and efficient DHI-certified Architectural Hardware Consultant, “AHC”, to approve its complete installation in order that all items shall be installed in the best manner and function properly. This will necessitate a job visit to certify the hardware installation prior to final inspection. The Contractor/Supplier shall be bona-fide direct distributor of all material furnished.

1.4 TYPE AND QUALITY

A. For purposes of designating type and quality of work of this Section, specifications are based on products of companies named. Products of other manufacturers may be approved if submitted for consideration, in accordance with Section 01600 – Materials and Equipment prior to bid date and approved by Addendum.

1.5 DELIVERY

A. All items of Finish Hardware shall be delivered to the project site, or as otherwise specified or required, and shall be checked in for completeness and familiarization with the Contractor. All items of Finish Hardware shall be packaged, numbered, labeled to identify each opening for which it is intended, and to correspond with item numbers on the approved Hardware Schedule.

1.6 INSTALLATION

A. All Finish Hardware to be installed on or in metal doors and/or frames shall be manufactured to template. Template machine screws shall be furnished for all such materials. This supplier shall furnish Hardware Schedule as approved by the Architect and all necessary templates to metal door and frame fabricators for their coordination use.

B. Coordinate with the General Contractor and the security access control contractor the location of required conduits and electrical devices required for the operation and function of electrical hardware components, including but not limited to power for transformers, electric locks, magnetic hold open devices, delayed egress at secured doors with panic devices and security system hardware.

1.7 SCHEDULES AND SUBMITTALS

A. Submit six (6) complete typewritten Hardware Schedules to the Architect and Owner for acceptance. After acceptance, provide required number of copies of accepted Hardware Schedule for distribution. No factory order shall be placed for materials until acceptance has been given by the Architect.

B. Two current copies of catalog cuts shall be submitted with the Hardware Schedule for each item of the Hardware listed in the Schedule.

C. Each item in the Schedule shall be identified on the first page of the Schedule by the manufacturer's name.

D. Submit a separate detailed keying schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

E. Provide sample lever sets for installation and verification of required clearances and mounting heights on panelized doors, or doors with applied trim.

F. Provide door hardware manufacturer's written certification at completion of the project, and certification that doors meet FBC ADA compliance.

1.8 RESPONSIBILITY

A. It shall be the Contractor/Supplier's responsibility to furnish Hardware in accordance with the intent of this Specification. Where, by virtue of Architectural design or by function, a change is necessary, Hardware of equal design and quality shall be furnished upon written approval of the Architect and Owner.

B. All Hardware shall meet the requirements of applicable codes. i.e. Underwriters Laboratory, International Building Code, and the local Fire Marshall.

1.9 TEMPLATES

A. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1. After hardware schedule has been approved, furnish templates required by manufacturing contractors for making proper provisions in their work for accurate fitting and finishing hardware setting. Furnish templates in ample time to facilitate progress of work.

1.10 QUALITY ASSURANCE

A. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.

1. Require supplier to meet with Owner to finalize keying requirements and to obtain final instructions in writing.

B. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction.

C. Door undercuts & Thresholds: Verify door undercut requirements and clearance heights for thresholds or finished floor elevations, and compliance with door rating requirements, as approved by the local Fire Marshall.

1.11 WARRANTY

A. In addition to the Manufacturer's warranty on all products and finishes on products specified in the Section, the Contractor/Supplier shall provide a warranty against defects in installation and workmanship for a period of (1) one year from the date of substantial completion of the building.

B. Provide the following manufacturers written warranty:

1. Locks & Latches: Three 3 years.

2. Closers: Ten (10) years.

3. Exits Devices: Three (3) years.

C. Refer to Division 01 Project Closeout Section for additional and detail requirements.

1.12 LOCATIONS

A. Hardware locations and maximum dimensions shall be as follows:
Distance from finish floor to center line of:

Door Knob	38" (96.5 cm)
Door Pull	42" (107 cm)
Deadlock	45" (114 cm)
Exit Bolt Cross Bar	38" (96.5 cm)
Push Plate	50" (127 cm)
Butt Hinges	Bottom Hinge - Finish floor to bottom of hinge 10" (25.4 cm). Top Hinge - Head rabbet to top of hinge 5" (12.7 cm).

Center Hinge - equal distance between top and bottom hinges.

B. Hardware locations shall be confirmed on panelized and trimmed doors. Verify that the levers will clear projected trim or moldings, and that the mounting heights will comply with FBC and Accessibility requirements.

1.13 180 DEGREE OPENINGS

A. Other than those doors that are restricted to less than 180 degree opening by building or by overhead holders or stops, all butts and/or closer arms shall be of sufficient size to allow full 180 degree opening of doors.

1.14 PRODUCT HANDLING

A. Tag each item or package separately with identification related to final hardware schedule and include basic installation instructions with each item or package.

B. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule.

C. Provide secure lock-up for door hardware delivered to the Project. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. To the greatest extent possible, obtain each kind of hardware from only one manufacturer.

B. All numbers and symbols used herein have been taken from the current catalogues of the following manufacturers.

PRODUCT	ACCEPTABLE MANUFACTURER	ACCEPTABLE SUBSTITUTE
1) Hinges	Ives	Stanley, Bommer
2) Locks & Latches	Stanley/Best	N/A As approved by Architect
3) Door Closers	LCN	Falcon, Norton, Rixson
4) Exit Device	Von Duprin	None
5) Wall Stops/Floor Stops, Flushbolts	Ives	Burns,Trimco
6) Kick Plates	Ives	Burns, Trimco

7) Threshold/Weather-strip Zero National Guard, Pemko
8) Silencers Ives Trimco, Rockwood
9) Wall mounted mag locks Security Door Controls or approved equal

C. If material manufactured by other than that specified or listed herewith as an equal, is to be bid upon, permission must be requested from the Architect prior to bidding in accordance with Section 01600 – Materials and Equipment. If substitution is allowed, it will be so noted by addendum.

2.1 BUTT HINGES

A. Doors 1-3/4" (4.4 cm) over 3'- 6" (1.07 m) in width and doors designated as high frequency (see Door Schedule) extra heavy weight (4) ball bearing 5" (12.7 cm) high.

B. Doors 1-3/4" (4.4 cm) thick - minimum 4" (10.2 cm) high.

C. Doors 1-3/8" (3.49 cm) thick - minimum 3-1/2" (10.2 cm) high.

D. Each door shall have not less than three hinges. Doors 7'-6" (2.29 m) and higher shall have four hinges whether specified under items or not.

E. All exterior out-swinging doors to have non-removable pins except where modified in the Hardware Schedule.

F. All butts used with door closers shall be ball bearing. All exterior doors shall have ball bearing butts, except as otherwise specified.

G. All exterior doors shall have stainless steel hinges.

2.2 LOCKSETS/DEADLOCKS

A. Shall be the following manufacturer and shall be furnished in the function as specified in the Hardware Sets. Products shall be provided as specified, substitutions will be considered in accordance with provisions of the Substitutions and Product Options Section in Division 01.

1. Locksets shall be Stanley/Best AK Series (Heavy Duty Locks/Levers) with interchangeable core for quick re-keying and customized master keying with 626AM – Satin Chrome with antimicrobial finish and the lever type shall match the existing building standard. Cylinder lock cores shall be Stanley/Best High Security Series 7 Pin Cores to match the Airport Facility Standard.

B. All levers, escutcheons and cylinders shall be the product of the manufacturer. Levers shall comply with required FBC Accessibility requirements.

C. Lockset latch bolt throw 3/4" (1.27 cm).

D. Electric Strikes and Locks (Where required for secured or access-controlled doors):

1. Provide electrically controlled locks and transformers where card reader or secured doors are indicated on the Drawings, scheduled, or required as part of Building security requirements, and shall be compatible with the Airport's access control system.

2. Locks shall be provided by Stanley/Best or approved equal.

3. Coordinate control with swipe card or proximity readers provided by Owner's security contractor.

4. Verify voltage provided to mag locks will not cause damage to the lock or failure to operate or overheating.

5. All electrically locked doors shall be provided with a pushbutton release for emergency egress, on the secured side of the door; power supply and transformers shall be furnished and installed for operation of all electric door locks specified or scheduled. Electric magnetic locks shall be compatible with the Airport's security system.

6. All exterior doors to have lock guards.

2.3 EXIT DEVICES

A. All devices shall be rim or vertical rod in type and function as specified. Devices must be listed under "Panic Hardware" in accident equipment of Underwriters Laboratories. All labeled doors with "Fire Hardware" must have labels attached and be in strict accordance with Underwriters Laboratories. Pulls and dummy trim shall be lever type. Panic devices shall be equipped with a 15 second delay at doors accessing secured areas and shall be coordinated and compatible with the Airport's security system.

Manufacturer	Series
Von Duprin	99

2.4 DOOR CLOSERS

A. Closers shall be one of the following manufacturers or approved equal and shall be furnished in the manufacturer's recommended printed size for the specified condition unless otherwise noted in the Hardware Sets. Closers shall be full rack and pinion complete with back check. Springs shall be motor clock type. Furnish flush mount transom brackets where no transom bar exists. Furnish parallel arm where required. Closers shall be required on all rated doors; spring hinges shall not be allowed, unless approved by the Architect. Sentronic series closers shall be tied to the fire alarm and shall automatically release the door in the event of a fire alarm and shall be 120V powered and shall be provided with a metal cover for custom finishing.

Manufacturer	Series

LCN 4041 and 4040 series (SEL)
Stanley QDC 100

B. Furnish door closers with proper arms and/or brackets to avoid conflict with door lites and/or low ceiling reveals.

C. Door closer cylinders shall be of high strength cast iron construction to provide low wear operating capabilities of internal parts throughout the life of the installation. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory.

D. Door closers shall utilize temperature stable fluid capable of withstanding temperature ranges of 120 degrees Fahrenheit to -30 degrees Fahrenheit, without requiring seasonal adjustment of closer speed to properly close the door. Closers for fire-rated doors shall be provided with temperature stabilizing fluid that complies with the standards FBC (latest Authority Having Jurisdiction accepted edition) and UL 10C.

E. Door closers shall incorporate tamper resistant non-critical screw valves of V-slot design to reduce possible clogging from particles within the closer. Closers shall have separate and independent screw valve adjustments for latch speed, general speed, and hydraulic back check; Back check shall be properly located so as to effectively slow the swing of the door at a minimum of 10 degrees in advance of the dead stop location to protect the door frame and hardware from damage. Pressure relief valves (PRV) are not acceptable.

F. All fire-rated doors shall receive automatic door closers.

G. Closers shall be mounted such that the closer unit and arm are concealed and not visible from finished common/public areas. Confirm and coordinate with the Architect on the location of closers, prior to initiating installation and frame hardware prep.

2.5 DOOR TRIM

A. All push plates, pulls, pull plates, kick plates and/or armor plates shall be any one of the following manufacturer's products or approved equal in catalog number as set forth herein.

Manufacturer	Push Plate	Pull Plate	Kick Plate
Rockwood	70C	125 x 70C	Custom Stainless Steel

B. Stainless steel plate material shall be minimum .050 gauge thick.

C. Provide stainless steel kick plates where scheduled or directed by the Architect at high impact doors and where door finishes will be damaged by carts or high usage. Kick plates to be 10 inches (254 mm) high; or fit to the bottom rail of the door type scheduled.

2.6 SILENCERS

A. All interior wood and metal door frames shall have door silencers Type 64 or 65, three per single door, two per pair of doors.

2.7 STOPS, HOLDERS, AND LOCK GUARDS

A. Stops shall be of the following manufacturers or approved equal:

1. Ives.

2. Rockwood.

3. Glynn-Johnson.

4. Rixson

B. Provide magnetic hold open devices at all rated doors schedule to remain in an open position, where shown or scheduled in the Drawings. Hold open device hardware shall be fully concealed and not visible on the public side of the door, when in an open position.

C. Doorstops shall be furnished for all doors to prevent damage to doors or hardware from striking adjacent walls or fixtures. Wall bumpers equal to Ives WS407 Series are preferred, but where not practical furnish floor stops equal to Ives FS436 or FS438 series. Where conditions prohibit the use of either wall or floor type stops, furnish surface mounted overhead stops equal to Glynn Johnson, 450 Series. Heavy duty floor stops shall be provided at exterior doors.

D. Lock guards shall be provided at all exterior doors.

2.8 THRESHOLDS AND DOOR STRIPPING PRODUCTS

A. Thresholds, where scheduled or required for thermal performance enhancement of an exterior door opening, shall be of the following manufacturer's or approved equal. See Hardware Schedule for types required.

1. Zero Weatherstripping Co., Inc.

2. Pemko Manufacturing Co.

3. Reese Enterprises, Inc.

4. Hager.

5. National Guard.

B. Thresholds shall be low profile, ADA compliant type thresholds throughout. Metal thresholds shall not be provided at stone or tile floors in Areas, thresholds for these

locations shall be stone or marble, where thresholds are required or shown on the Drawings. Exterior door thresholds shall be set in a full bed of sealant.

C. Provide sound rated hardware consisting of door sweeps, thresholds (or auto door bottoms) and concealed door bottom gaskets at base of all sound rated doors where shown or scheduled on the Drawings.

1) At frames, surface-applied-self-adhesive sound gaskets shall be equal to Pemko – S88, Black, or approved equal.

2) Provide concealed-sound-rated auto-door-bottoms, Pemko- 434 RL, or approved equal at sound rated doors.

2.9 KEYING

A. All locks shall be master keyed as directed by the Architect or Owner. Submit a proposed keying schedule for approval. Furnish six (6) master keys and two (2) keys for each lock. All locks shall be construction keyed. Furnish four (4) construction master keys. Keys shall be mastered keyed to the Airport Building Standard.

1. Hardware supplier to provide temporary cylinders or cores during the construction phase and or construction keyed cylinders as scheduled. The contractor is to change out the temporary cylinders for the permanent cylinders.
2. Coordinate keying with the Airport where applicable.

2.10 FASTENINGS

A. All screws shall be of matching finish to their product and shall be the manufacturer's standard for that item.

B. Sex Bolts - Door closers, door holders, and exit devices installed on wood doors shall be attached by means of the bolts and sex nuts.

2.11 KEY CABINET

A. Furnish a key cabinet complete with accessories to accommodate all keys.

Manufacturer	Model No.
Telkee	AWC-250-S

B. Prepare and furnish the Owner with complete index of keys as directed by the Architect. Tag and file all keys in cabinet location as directed by the Architect. Hardware supplier shall deliver keys, index lists, and cabinet, set-up and assembled to the jobsite.

2.12 FINISHES

A. Where not specifically called out in the Finishing Manuals, for all non-public access areas and exterior doors, provide hardware items in finish US32D Stainless Steel in, or as indicated below.

1.	Butts – Exterior	Match door lever
2.	Butts - Interior	Match door lever
3.	Locks	Match door lever
4.	Push/Pulls, Kickplates, Lock Guards	Match door lever
5.	Closers	Match door frame or Spray painted to match hardware per Architect's approval.
6.	Door Stops & Miscellaneous	Match door lever
7.	Exit Devices	Match door frame

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of surface protections with finishing work specified in the Division 9 Sections. Do not install surface mounted items until finishes have been completed on the substrate.

B. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

C. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

D. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly as intended for the application made.

E. Instruct Owner's personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.

F. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Division 7 Section "Joint

Protection,"

H. Weather-stripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.2 ADJUSTING AND CLEANING

A. Contractor shall adjust all hardware in strict compliance with manufacturer's instructions. Prior to turning over the project to Owner, Contractor shall clean and make any final adjustments to the finish hardware.

B. Hardware locations shall be as recommended by the Door Hardware Institute, 4 copies of the brochure shall be forwarded to the General Contractor.

C. Closer adjustment: A representative of the closer manufacturer shall visit jobsite, adjust and regulate all closers and inspect to see that they are installed according to factory recommendations and Florida Building Code (ADA) requirements and shall provide written certification of compliance.

D. Manufacturer's or Architectural Hardware Consultant's certification letter of project requirements shall be provided at the completion of the project.

E. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.

F. Clean adjacent surfaces soiled by hardware installation.

3.3 PROTECTION

A. Contractor shall protect hardware as it is stored on construction site in a covered and dry place.

B. Contractor shall protect exposed hardware installed on doors during the construction phase.

3.4 HARDWARE SCHEDULE

A. Submit required Hardware Schedule per Article 1.8 of this Section.

B. Change-out all temporary construction key cylinders once the locked space has been finished, and all construction work has been completed and accepted by the Owner and the Architect.

4.0 HARDWARE SETS:

A. The following schedule is furnished for whatever assistance it may afford the Contractor; do not consider it as entirely inclusive. Should any particular door or item be omitted in any scheduled hardware group, provide door or item with hardware same as required for similar purposes. Quantities listed are for each pair of doors or for each single door. The Contractor shall verify the function, operation, and compatibility of all electrified hardware with the Owner's security access control and the fire alarm systems.

B. Manufacturer index:

ACC = Accurate Lock	SCH = Schlage Lock
FRA = Frascio International	STA = Stanley
FSB = FSB USA	VON = Von Duprin
GLY= Glynn-Johnson	ZER = Zero International
IVE = Ives	LAR = Length As Required
LCN = LCN Closers	LDW = Less Door Width
PEM = Pemko	SDC = Security Door Controls
RIX = Rixson	
B/O = By Door Manufacturer	

* NOTE: All levers to be antimicrobial "AM"

Hardware Group No. 01

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CYLINDER	AS REQUIRED BALANCE OF HARDWARE BY DOOR MANUFACTURER CARD READER – By Owner	626	SCH

Emergency egress push button to release lock

PRESENTATION OF VALID CREDENTIAL TO CARD READER ACTIVATES AUTOMATIC DOOR

Hardware Group No. 02

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD EPT	628	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL+-HH-3547A-NL-OP-388-338	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	MAGNETIC LOCK	M490P ATS/LED	628	SCE

1	EA	LONG DOOR PULL	9264 72" 56" STD	630	IVE
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4021 DEL	689	LCN
1	EA	THRESHOLD	65A MSLA-10	AL	ZER
1	EA	POWER SUPPLY	PS904 900-4R-FA	LGR	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	LGR	VON
1	EA	LOCKGUARD	LG1	630	IVES
			CARD READER – By Owner		

Balance of Door Hardware to be supplied by Aluminum Door Supplier 08410
Card reader both sides to unlock panic hardware/then unlock magnetic lock/both sides
Wiring Diagram by Hardware Supplier
Card reader to unlock electric lock by security supplier
Emergency egress push button to release lock
Panic device delayed 15 seconds when door is locked.

PRESENTATION OF VALID CREDENTIAL TO CARD READER UNLOCKS DOOR

Hardware Group No. 03

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080P 06A	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	LOCK GUARD	LG1	630	IVE
1	EA	RAIN DRIP	141AA	AA	ZER
1	EA	THRESHOLD	65A-MSLA-10	A	ZER
3	EA	GASKETING	328AA	AA	ZER

Hardware Group No. 04

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070P 06A	626	SCH
1	EA	DUMMY LEVER			
1	EA	RIM HOUSING	20-079	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
2	EA	MANUAL FLUSH BOLT	FB458	605	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	OH STOP	450S	630	GLY
1	EA	MEETING STILES (IN ACTIVE DOOR)	381	A	ZER

Hardware Group No. 05

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050P 06A	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 06

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	EU MORTISE LOCK	L9092PEU 06A RX	626	SCH
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS902	LGR	SCE
1	EA	SURFACE CLOSER (W/HOLD OPEN)	4040SEL-24V	689	LCN
1	EA	POWER SUPPLY	4040SEL-3210	689	LCN
3	EA	SILENCER	SR64	GRY	IVE
			CARD READER-By Owner		

Card reader to unlock electric lock, Occupancy sensor or swipe to unlock door on non-secure side.

PRESENTATION OF VALID CREDENTIAL TO CARD READER UNLOCKS DOOR

Hardware Group No. 07

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD EPT	628	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL+-HH-98-L-06	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	MAGNETIC LOCK	M490P ATS/LED	628	SCE
1	EA	SURFACE CLOSER	4040XP CUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E	630	IVE
1	EA	THRESHOLD	65A MSLA-10	AL	ZER
1	EA	POWER SUPPLY	PS904 900-4R-FA	LGR	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	LGR	VON
1	EA	LOCK GUARD	LG1	630	IVES
			CARD READER-By Owner		

Card reader both sides to unlock panic hardware/then unlock magnetic lock/both sides
Wiring Diagram by Hardware Supplier
Card reader to unlock electric lock by security supplier
Emergency egress push button to release lock
Panic device delayed 15 seconds when door is locked.

PRESENTATION OF VALID CREDENTIAL TO CARD READER UNLOCKS DOOR

Hardware Group No. 08

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080P 06A	626	SCH
1	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 09

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	EU MORTISE LOCK	L9092PEU 06A RX	626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA	689	LCN
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS902	LGR	SCE
3	EA	SILENCER	SR64	GRY	IVE
			CARD READER – By Owner		

Card reader to unlock electric lock, Occupancy sensor or swipe to unlock door on non-secure side.

PRESENTATION OF VALID CREDENTIAL TO CARD READER UNLOCKS LOCKSET.

Hardware Group No. 10

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY LOCK	L9040 06A L583-363	626	SCH
1	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 11

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	L9010 06A	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No.12

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8302 10" 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	4040XP RW/PA	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group N0.13

Provide each SL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CYLINDER	AS REQUIRED BALANCE OF HARDWARE BY DOOR MANUFACTURER	626	SCH

Refer to Alternate number 5 for barn door; provide door pulls and overhead track for barn doors, in lieu of door hardware for glass door, if Alternate is accepted.

Hardware Group No. 14

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
2	EA	BIPARTING DOOR TRACK (w/FASCIA)	BP250N-02-XX	15	STA
4	EA	HANGAR SETS	BO25ON-HDW	15	STA
4	EA	DOOR PULL	B250-63	15	STA
5	EA	CENTER TRACK STOP	B250-77	AA	STA
2	EA	FLUSH BOLTS (AT INACTIVE PANELS)	FB458	605	IVE
2	EA	FLOOR GUIDES	BP150-75	WHITE	STA
1	EA	WALL STOP	WS406/407CCV	630	IVE

Hardware Group No. 15

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	L9010 06A	626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA	689	LCN
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	SOUND GASKETING	S88	GRY	PEM
1	EA	AUTO BOTTOM	360 AA LS-36-W/Z49	AA	ZER

Hardware Group No. 16

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458	605	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	L9080P 06A	626	SCH
2	EA	OH STOP	450S	630	GLY
1	EA	COORDINATOR	COR52, WFL20 FILLER	628	IVES

ASTRAGL BY DOOR SUPPLIER

Hardware Group No. 17

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458	605	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	L9080P 06A	626	SCH
2	EA	OH STOP	450S	630	GLY
1	EA	COORDINATOR	COR52, WFL20 FILLER	628	IVES
1	EA	SOUND GASKETING	S88	GRY	PEM
2	EA	AUTO DOOR BOTTOM	361	AA	ZER

ASTRAGL BY DOOR SUPPLIER

END OF SECTION 08710

SECTION 08800 – INTERIOR GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes interior glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Doors with glazing where scheduled or shown.

B. Related Sections:

1. Division 8 Section "Aluminum Entrances, Window Walls and Exterior Glazing" for exterior glazing.

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

1.4 ACTION SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.1 INFORMATIONAL SUBMITTALS

A. Product Certificates: For glass and glazing products, from manufacturer.

1.2 QUALITY ASSURANCE

A. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

B. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F, and the fire-resistance rating in minutes.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

1.5 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

B. Strength: Where float glass is indicated, provide annealed float glass, fully tempered, Kind FT heat-treated float glass.

C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
2. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

A. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
2. For uncoated glass, comply with requirements for Condition A.
3. For coated vision glass, comply with requirements for Condition C (other coated glass).

B. Tempered Patterned Glass: ASTM C 1048, Kind FT (fully tempered), Type II, Class 1 (clear), Form 3; Quality-Q6, Finish F1 (patterned one side).

1. Basis-of-Design Product: Subject to compliance with requirements, provide pattern, frosted, or fluted glass as scheduled or comparable product by one of the following:

a. Guardian Industries
b. Pilkington Glass
c. PPG Industries

2.3 FIRE-PROTECTION-RATED GLAZING

A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 for door assemblies and NFPA 257 for window assemblies.

2.4 GLAZING GASKETS

A. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene, EPDM or silicone gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

B. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

2.5 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Acid-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Dow Corning Corporation; 999-A.
b. GE Advanced Materials - Silicones; Contractors SCS1000 Construction SCS1200.
c. Tremco Incorporated; Proglaze Tremsil 200.
d. BASF Building Systems; OmniPlus.

C. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other

glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.7 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

2.8 MONOLITHIC-GLASS TYPES

A. Refer to door schedule for glass type, pattern, rating, and clear glass. All glass in doors and side lights adjacent to doors shall be tempered glass.

B. Glass Type GL-CLR: Clear fully tempered float glass (where scheduled or shown on the drawings).

1. Thickness: 6.0 mm.
2. Provide safety glazing labeling.

C. Glass Type GL-Plate Fluted – Shall be Tempered patterned glass, where shown or scheduled.

2.9 FIRE-PROTECTION-RATED GLAZING TYPES AT RATED DOORS

A. Glass Type GL-FG: 20-minute coordinated with the rating of the wall or door installed and fire-rated glazing with 450 deg F temperature rise limitation; laminated glass with intumescent interlayers at fire rated doors with ratings or located within rated walls.

1. Provide safety glazing labeling.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when

installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.5 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.6 LOCK-STRIP GASKET GLAZING

A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system unless otherwise indicated.

3.7 CLEANING AND PROTECTION

A. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

B. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

C. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

D. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08800

SECTION 08905 – ALUMINUM ENTRANCES, WINDOW WALLS AND EXTERIOR GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Description of the Work:

1. Furnishing and installation of aluminum-framed entrances, exterior aluminum windows and/or window walls and exterior glazing for the conditions outlined by the Drawings or requirements of the specifications.

2. Provide labor, materials, equipment and related items as shown on Drawings and as specified. Provide items not specifically mentioned but necessary to complete the work, including, but not limited to:

a. Anchorage to building structure, including the bracing to the primary building structure where required to provide support for forces imposed by work of this section, furnishing of embeds (where required) for installation by General Contractor based on the layout drawing furnished by the glass and glazing Installer/subcontractor.

b. Special fabrication and reinforcing of segmented framing, sills and sub-sill flashing, where shown or required.

d. Sealants within work of this section and at boundaries with work of other sections.

e. All products proposed for the project shall have a Notice of Acceptance (NOA) certification, or FBC product approval approved by the State of Florida, in accordance with the local AHJ-Authority Having Jurisdiction requirements. Furnish complete NOA (or FBC product approval) certification package with Test Reports with preliminary proposal. NOA's (or FBC product approval) certifications will be required for all windows and storefront elements shown on the Drawings prior to approval for fabrication.

f. Glass visual mock-ups.

g. Field quality control tests.

1.3 RELATED SECTIONS

A. Coordinate work of this Section with work of other Sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other Sections, including:

1. Division 3 Section “Cast-In-Place Concrete.”

2. Division 4 Section “Unit Masonry Assemblies.”

2. Division 7 Section “Caulking and Sealants.”

3. Division 8 Section “Sliding Automatic Entrance Doors.”

4. Division 8 Section “Interior Glazing.”

5. Division 9 Section “Gypsum Board Assemblies.”

1.4 REFERENCES

A. Except as otherwise specified, comply with:

1. Aluminum Association (AA)

a. Aluminum Design Manual.

b. Aluminum Standards and Data.

2. American Institute of Steel Construction (AISC)

a. M-016 Manual of Steel Construction Allowable Stress Design, Ninth Edition.

3. American Iron and Steel Institute (AISI)

a. Specification for the Design of Cold-Formed Steel Structural Members.

b. Stainless Steel Cold-Formed Structural Design Manual.

4. American Society of Civil Engineers (ASCE)

a. ANSI/ASCE-8 Specification for the Design of Cold-Formed Stainless Steel Structural Members.

5. American Welding Society (AWS)

a. D1.1 Structural Welding Code--Steel.

6. American Concrete Institute (ACI)

a. Building Code Requirements for Reinforced Concrete (ACI 318)

7. American National Standards Institute (ANSI)

a. ANSI Z97.1 Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings

b. ANSI/SMA 1004 Specifications for Aluminum Tubular Frame Screens for Windows.

8. Glass Marketing Association of North America (GANA) Glazing Manual.

9. General Services Administration

a. GSA Specification TT-P-645B for Alkyd Type Zinc Chromate Primer Paint.

b. FS-RR-W-365 Federal Specification Wire Fabric (Insect Screening).

10. American Architectural Manufacturers Association (AAMA)

a. AAMA/NWWDA 101/I.S.2 Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors.

b. AAMA 501.1 Standard Test Method for Exterior Windows, Curtain Walls and Doors for Water Penetration Using Dynamic Pressure.

c. AAMA 502 Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage.

d. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum.

e. AAMA 2604 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels for powder coatings, where provided.

f. AAMA 2605 Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels for Kynar coatings, where provided.

g. AAMA TIR-A9 Metal Curtain Wall Fasteners.

11. ASTM International (ASTM)

a. A 36 Specification for Carbon Structural Steel.

b. A 123 Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

c. A 500 Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

d. A 501 Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

e. A 653 Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

g. B 244 Test Method for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments.

h. C 509 Specification for Elastomeric Cellular Preformed Gasket and Sealing Material

i. C 794 Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.

j. C 864 Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.

k. C 1036 Specification for Flat Glass.

l. C 1048 Specification for Heat-Treated Glass--Kind HS, Kind FT Coated and Uncoated Glass.

m. C 1087 Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.

n. C 1115 Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories.

o. C1172 Standard Specification for laminated Architectural Flat Glass

p. C 1248 Test Method for Staining of Porous Substances by Joint Sealants.

q. C 1376 Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Glass

r. C 1521 Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.

s. D 2244 Test Method for Calculation of Color Differences From Instrumentally Measured Color Coordinates.

t. D 4214 Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.

u. E 283 Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

v. E 330 Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

w. E 331 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

x. E 987 Standard Test Methods for De-glazing Force of Fenestration Products.

y. E 1300 Standard Practice for Determining Load Resistance of Glass in Buildings.

12. Florida Building Code - Current Edition in effect - Test Protocols for High Velocity Hurricane Zones

13. Comply with the Florida Building Code –Current Edition in effect, NFPA 101 - Current Edition in effect and Florida Accessibility Code - Current Edition and or where required by this Section, exceed the Code. Nothing in this Section shall be construed as allowing or requiring noncompliance with Code.

14. Insulating glass certification council (IGCC) CBA.

1.5 SUBMITTALS

A. Submit drawings and product data under provisions of Section 01300 and as further described in this section.

B. **Preliminary Submittal:** Submittals for information only, shall be as described below. Upon request, promptly submit additional information and clarification of intent.

1. Submit paint manufacturer's approval of paint applicator, as required for warranty.

2. Complete NOA (or FBC product approval) certifications including fastener requirements and technical data provided or required for window system approval by State of Florida, for all assemblies indicated or shown on the Drawings.

3. Proposed paint manufacturer's warranty for coating system.

4. Sealant system technical data sheet proposed for the project.

5. Provide written statement of full compliance with the Drawings and Specifications. If deviations are proposed, provide an itemized list of specification and architectural drawing requirements which are not embodied in contract, or intended contract, for work of this section. Identify specification

page and paragraph, or architectural drawing sheet, elevation, plan, section or detail for each item. Deviations not specifically identified shall not be deemed valid in submittal review. Failure to provide either a statement of full compliance or an itemized list of deviations shall, at reviewers' discretion, shall be cause for return of preliminary submittals without review. Where NOA (Notice of Approval) lists more than one option, indicate clearly on the preliminary submittal which option is proposed for use on the project.

6. Written certification from the glass and aluminum manufactures that materials that are being provided are manufactured and fabricated domestically, within the United States.

D. **Shop Drawing Submittals:** Submittals for approval, submittals shall be complete and in required form. Resubmittals shall include requested corrections and shall respond to previous comments. Each revised sheet shall bear a revision date and number. Revisions shall be flagged with conspicuous revision symbols and numbers. Failure of submittals to be complete, in the proper form, responsive to comments, or identify revisions shall be cause for disapproval and return of documents without review. Failure of review comments to note a noncompliance with plans and specifications shall not relieve the Contractor from his obligation to comply.

1. Failure of review comments to note a noncompliance on a given submittal shall not preclude a directive to comply on future submittals. A maximum of two reviews will be performed without additional cost to the Contractor. If a submittal does not achieve an approved status by the second submittal, cost of additional reviews by Architect and Consultant shall be borne by Contractor

2. Submit drawings showing materials in place on building. Drawings shall include elevations, floor plans, sections and full size details. Details shall be fully drawn (not outlined). Drawings shall include the following information.

   a. Identify those products which, by Code, are subject to “impact” testing requirements or are required to have Product-Notice of Approval. and/or Product Label.

   b. Joinery and internal seals (details showing sill flashing, head receptors, sill and mullion intersections with details of sealing) as required for special conditions of window wall assembly.

   c. Identify products (by name and manufacturer) and provide details for any required thermal insulation and/or safing insulation.

   d. Metal alloy, temper, thickness, and finish.

   e. Glass thickness, strength, tint, and coating.

   f. Fastener alloy, strength, plating, diameter, length and spacing.

   g. Glazing materials identification

h. Sealant identification by product name.

i. Dimensions of the window wall assembly, relative to the layout of adjoining walls, beams, columns and slabs.

j. Dimensioned position of glass edge relative to metal daylight.

k. Provisions for movements and for internal reinforcement, where required

l. Locations of, and details for, embedded anchors

m. Location, manufacturer's part #, and samples or manufacturer's cut sheets for all hardware, thresholds and locking devices.

n. Weld information and weld symbols conforming to AWS conventions.

o. Glazing details applicable to replacement glass, with outline of procedure for glass replacement, to be provided as part of closeout documents.

p. Anchor details, showing provisions for adjustment of anchors to accommodate specified building structure tolerances..

q. Sample of coating manufacture’s specific project warranty certification and approval of applicator.

3. Submit glass manufacture's wind pressure analysis, thermal stress analysis, and manufacture's written review of shop drawings stating that details including glass products are suitable for the proposed use, including Code required “impact” resistance, glass bite, support clearances, air circulation on interior and consideration of the effects of exterior shading

4. Submit sealant manufacture's test reports confirming sealant adhesion, compatibility and absence of staining of adjacent materials. Submit application and quality control procedures for sealants.

5. Submit laboratory test reports for thermal tests performed in accordance with AAMA 1503.

6. When NOA (or FBC product approval) certifications are not available for a window assembly as a part of the preliminary submittal requirements outlined in this specification, or NOA (or FBC product approval) certification testing is in progress and not yet complete submit structural calculations to demonstrate that the assembly shall ultimately comply with FBC / and NOA requirements, prior to fabrication. Submit structural calculations prepared by a State of Florida licensed Structural Engineer in conformance with referenced documents and this section. Calculations shall be legible and shall incorporate sufficient cross references to shop drawings to make calculations understandable and readily reviewable. These structural calculations shall not waive the FBC requirements to provide product testing and NOA compliant

assemblies scheduled to be installed. **THE MANUFACTURER SHALL BE SOLELY RESPONSIBLE FOR ENSURING THAT THE WINDOW ASSEMBLIES MEET OR EXCEED THE FBC-NOA** (or FBC product approval) **COMPLIANCE PRODUCT REQUIREMENTS, IF FABRICATION IS INITIATED PRIOR TO NOA** (or FBC product approval) **TESTING IS COMPLETED.** Test reports are not an acceptable substitute for calculations. Calculations shall include:

a. Analysis of framing members, including provisions for thermal and building movements.

b. Analysis of anchors, including anchors embedded in concrete

c. Section property computations for framing members

d. Seal and signature of professional engineer registered in the state of Florida, with certification of compliance with specified performance criteria.

7. Submit record drawings as part of contract close-out documents, showing all changes made during construction.

8. Submit written certification from the installing contractor that hardware and door operating pressures comply with FBC accessibility code requirements for door operation.

E. Samples:

1. Submit for approval four (4) sets of labeled samples of each type and color of metal finish, on 12 inch long sections of extrusion shapes and 12 inch squares of sheet metal. Samples shall show extremes of color and texture variation. Samples will be reviewed by the Architect for color and texture only. Compliance with other requirements is the responsibility of the Contractor.

2. Submit for approval four (4) sets of labeled 12 inch square samples of each type of glass. Provide, at project, site visual mock-up using full size glass, for evaluation of color range and distortion of reflected image.

1.6 QUALIFICATIONS

A. Aluminum Fabricator: Company specializing in fabrication of architectural aluminum extrusions and sheet with satisfactory completion of similar work and of adequate financial responsibility. Engineer providing structural design shall be licensed in the State the work is to be completed and have experience designing architectural aluminum.

B. Glass Supplier and Fabricator: Company specializing in manufacture of flat glass and fabrication of architectural glass.

C. Gasket Supplier: Company specializing in manufacture of products specified in this section.

D. Sealant Supplier: Company specializing in manufacture of products specified in this section.

E. Installer: Company specializing in performing work of this section.

1.7 DESIGN REQUIREMENTS

A. Contract Documents define design intent and performance requirements. Details show intended relationships and preferred profiles. Contractor shall develop and provide final design details and shall be fully responsible for the conformance of the installed work to the design criteria herein.

B. Unless otherwise defined by Contract Documents, appearance of exposed elements, including width and depth, shall be consistent throughout the project for similar or like window opening conditions and/or configurations.

C. Unless otherwise defined by Contract Documents, overall thickness of each glass type, and component thickness of multiple layer glass types, shall be consistent throughout the project for similar or like conditions.

. D. Provide anchor adjustment capability for full range of specified tolerances for building structure, but not less than one inch in all directions, or dimensional requirements to accommodate construction tolerances of concrete and masonry openings in accordance with the Specifications.

E. Design wind pressures shall be in compliance with Authority Having Jurisdiction wind pressure maps, FBC, and the Structural Drawings. Block diagrams are shown on the Structural Drawings.

F. Wind pressures act perpendicular to flat surfaces, regardless of surface orientation. Wind pressures act perpendicular to tangents of curved surfaces. At corners and other changes in plane, either the inward pressure or the outward pressure shall be assumed to affect the two adjoining surfaces simultaneously. Design for simultaneous occurrence of inward pressure on one surface and outward pressure on adjoining surface is not required.

G. Structural elements of the work shall meet the requirements of applicable state and local codes and the requirements of rule 16B33.007 of the Department of Environmental Protection, State of Florida.

H. Structural Design Method:

1. Structural engineering, where required, shall be completed by a licensed Engineer, registered in the State of Florida, and calculations shall be completed in accordance with standard engineering practices, consistent with the requirements of the Florida Building Code (FBC) and FBC-NOA (or FBC product approval) certification.

I. Framing Members:

1. Glass, sealants and interior finishes shall not be assumed to contribute to framing member strength, stiffness or lateral stability.

2. Compression flanges of flexural members may be assumed to receive effective lateral bracing only from (a) anchors to building structure and (b) horizontal glazing rails or interior trim which contact the compression flange. Points of contra-flexure shall not be regarded as lateral braces or as end points of an unbraced length; unbraced length shall be the distance between effective lateral braces.

3. Where a framing member reaction is resisted by a continuous element, maximum assumed effective length of resisting element shall be four times the bearing length, but not more than one foot.

4. Splice joints permitting movement shall be assumed to have zero moment capacity.

5. Where a framing member runs continuously past a deflecting support, combined deflection of member and support shall not exceed specified limits.

6. Thermal breaks are not required and, if provided, shall be assumed to have no ability to transfer shear stress for composite action of flexural members (elements joined by a thermal break shall be assumed to act separately).

J. Fasteners

1. General Requirements

a. Quantity, spacing and length of fasteners shall be designed and engineered by the window wall manufacturer for specific jamb, head and sill conditions consistent with the NOA certification, approved by the State of Florida, and wind loading criteria as shown on the structural drawings.

b. Tension shall be taken as sum of direct tension plus tension due to prying.

c. Penetrations of a shim stack with total thickness "t" by a fastener with nominal diameter "d" shall require reductions in allowable tension and shear forces. Minimum reduction shall be zero percent for t=d, varying linearly to 100 percent for t=2d. Such reduction shall be in addition to any other reductions which may be applicable. An acceptable alternative method is to assume that shims provide no resistance to fastener bending, compute fastener bending stress with cross sectional properties based on root diameter, add bending stress to tension stress, and evaluate tension/shear interaction. Allowable stress for bending shall be the same as allowable stress for tension per standard engineering analysis or by an FBC approved NOA certification.

d. Unless otherwise specified, combined tension and shear shall be evaluated according to an interaction formula in which each term equals the square of actual force divided by the square of allowable force. Sum of terms shall not exceed 1.0.

2. Allowable stresses for aluminum fasteners shall comply with Aluminum Design Manual.

K. Glass:

1. Wind pressure shall be treated as short duration load and gravity loads shall be treated as long term load, as defined by ASTM E 1300.

2. Probability of breakage upon first application of design pressures shall not exceed 8/1000 for vertical glass, and 1/1000 for sloped and horizontal glass. Glass strength and size shall conform to code and ASTM E 1300.

3. Provide heat treated glass where annealed glass would be vulnerable to thermal breakage.

4. Spandrel glass units where shown or indicated on the Drawings to comply with adjacent glazing criteria. Color and tint to match adjacent glazing; tint color shall be bronze or color as selected by the Architect from full range of glass colors. Spandrel glasss will not be an acceptable substitute for frosted glass, where shown or required by the contract documents.

L. System shall be designed to support its own weight in combination with other specified pressures and loads.

M. Movements:

1. Provide movable joints (specific and defined provisions acceptable to the Architect), where required, to accommodate all specified building movements, as well as manufacturing tolerance, field tolerance, irregularities in adjacent surfaces, thermal movement, wind sway, floor sag, beam sag and column shortening. Except where otherwise specifically defined by the Structural Engineer, the design allowance for differential beam and/or floor edge sag, live load floor deflection and creep shall be not less than 0.5 inch.

   The manufacturer shall confirm with the Building Structural Engineer the live load deflection criteria, before submitting the shop drawings for approval.

2. Theoretical and as-built glass bite relative to metal frame shall not be less than 0.375 inch and theoretical and as-built glass edge clearance to nearest metal shall not be less than 0.25 inch. Provide minimum 3/16 inch face clearance (glass-to-metal).

3. Thermal component of joint movement shall be based on minimum material temperature increase of 100 degrees F and decrease of 60 degrees F relative to nominal condition. Assume entire cross section has uniform temperature.

Design summer surface temperature is 180 degrees F. All components including adhesives and sealants shall be capable of withstanding without failure design temperatures with simultaneous specified loads.

4. At any floor, in-plane displacement shall be assumed to occur while floors immediately above and below remain stationary. There shall be no failure or gross permanent distortion of anchors, frames, glass, or stone; gaskets and weatherstrips shall not disengage; weather seals shall not fail.

N. Systems which rely upon a single line of defense against water infiltration are not acceptable. Provide integral or secondary gutters and weep systems inboard of the primary line of weather-seal to collect and drain water leakage to the exterior. Window walls, and windows which are internally drained to the sill utilizing integral weeping sill, shall have continuous (permanently spliced and sealed) sill flashing gutters with water-tight, fully sealed (from front to back) to the adjacent building structure at all terminal conditions (or provided with fully sealed metal end caps) and shall have a head rail which collects and contains infiltration at each glazed opening, drained, either directly to exterior or, in a contained and concealed manner, within the system to the flashed and externally drained sill gutter.

Segmented (curved in plan) areas of the work require specific attention to assure both adequate provision for the specified movements and long term provision for the water-tight performance of the segmented wall mullions, heads, sills and their splice details.

Glazing details shall permit glass replacement after initial construction, shall permit reuse of original gaskets, shall permit replacement glass of same nominal size as original glass, and shall not require cutting of framing members or removal of interior finishes.

O. Vision glass exterior, and spandrel glass shall be replaceable from the exterior.

P. Snap engaged or slide on components shall be mechanically secured against migration. Snap engaged components shall not serve any primary structural function, such as retention of glass or panels. Snap engaged plastic components are not permitted, except as nonstructural thermal improvement for interior trim. Joints in continuous snap covers and other continuous trim shall have splice sleeves of same material and finish as cover or trim and the locations of all such joints shall be clearly shown on the shop drawings.

1.8 PERFORMANCE REQUIREMENTS

A. Structural Criteria:

1. At pressures and loads from zero to 150 percent of design values:

a. Framing member residual deflection after pressure or load is removed shall not exceed 1/1000 times distance between supports or 2/1000 times cantilever length.

b. At anchors, framing member deflection relative to building structure shall not exceed 0.187 inch, nor 0.125 inch after pressure or load is removed.

c. Upon reversal of pressure or load direction, relative movement between two components that are fastened or clamped together shall not exceed 0.187 inch.

d. There shall be no disengagement, failure or significant permanent distortion of any component, including glass and gaskets.

2. At 100 percent of design pressures and loads :

a. Unless otherwise stated by code, net deflection perpendicular to enclosure surface for framing members supporting glass or metal panels shall not exceed: L/180 pursuant to Florida Building Code.

b. Net deflection of framing members parallel to enclosure surface shall not exceed smallest of: 0.125 inch due to dead load; 0.125 inch change in opening size at any point; 1/360 times distance between supports, not to exceed 0.375 inch.

c. Net deflection parallel and perpendicular to enclosure surface for framing members at perimeter sealant joints shall not exceed smallest of values specified above; 50 percent of joint width; movement capacity of sealant.

d. Where applicable, metal panel center deflection shall not exceed 1/100 of the shorter panel dimension.

B. Sealants used as weather seals shall not experience adhesive or cohesive failure. Sealants shall withstand movements up to the limits prescribed by manufacturers. Exposed sealant surface shall not crack or bubble. Sealant and primers shall not stain adjacent materials. Sealants shall be used only if manufacturers' adhesion, compatibility and stain tests yield favorable results. Sealants shall not be placed against edge of laminated glass interlayer

C. Glass:

1. Glass shall not experience spontaneous breakage.

2. Glass coating shall not crack, peel, stain or discolor.

3. Glass center deflection relative to supported glass edges at 50 percent of specified design pressures shall not exceed one inch. Glass deflection at 1.5 times design pressures shall be limited to prevent disengagement from frame, unless the deflection criteria may be reduced by FBC approved NOA (or FBC product approval) certification of the assembly.

4. Laminated glass shall not delaminate, stain or discolor.

5. Glass shall comply with all window wall assembly NOA certification and

FBC requirements.

D. Snap engaged components shall not disengage when subjected to a concentrated force of 10 pounds or during mock-up structural tests.

E. Window Systems

1. U factor < 0.45; SHGC <= 0.25.

1.9 PRODUCT TESTING

A. At all exterior building envelope conditions, as mandated by Florida Building Code, pay all costs and make all necessary arrangements for Small and/or Large Missile Impact Testing, related detailing, testing, or other actions as may be required to obtain current Product Approval for NOA (or FBC product approval) certification, as required and approved by the State of Florida, and/or Product Labeling from the agencies having authority.

1. Submit complete documentation verifying current Product- Notice of Approval (NOA) (or FBC product approval) certification, for all such products proposed for use on this building.

B. Refer to Part 3 of this specification for requirements for field testing of the assembly. Payment for labor and materials shall not exceed the limitations outlined in division one, unless quality assurance testing has been satisfactorily completed, at the time payment request is submitted.

C. Glass Visual Mock-ups:

1. Prior to ordering glass, the Contractor shall provide, glass samples a minimum of 12 inch x 12 inch. Provide production thickness, tint, coating and heat treatment.

2. Owner and Architect shall inspect glass samples for acceptability, as evidenced by color, color consistency, match and appearance of reflected image. If acceptable, glass samples shall be retained as an acceptance standard for production material. If not acceptable, provide additional samples for inspection until acceptable color and appearance is obtained

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver fabricated units and component parts to project site completely identified in accordance with erection diagrams prepared by this contractor.

B. Store materials in accordance with manufacturer's instruction, above grade on dunnage, properly protected from the weather and construction activities and so located as to facilitate access to, and handling of, all materials, and in accordance

with Section 01600 – Materials and Equipment and Section 01620 – Storage and Protection.

C. Replace all damaged materials.

1.11 SEQUENCING

A. Coordinate with requirements of material and personnel hoists. Defer installation at obstructed areas, and install materials when obstructions are removed.

1.12 WARRANTY

A. Provide written warranty agreeing to repair or replace defective materials and workmanship during warranty period. Defective materials and workmanship include, but are not limited to:

1. Abnormal deterioration, aging or weathering.

2. Water leakage.

3. Air leakage exceeding specified limits.

4. Failure of operating parts to function normally.

5. Structural failure.

6. Sealant loss of adhesion, loss of cohesion, cracking or discoloration.

7. Disengagement of gaskets, weatherstrips, trim or other accessories

8. Deterioration or discoloration of aluminum finish.

9. Glass breakage including: secondary breakage caused by falling glass; spontaneous breakage of heat treated glass.

10. Delamination or discoloration of laminated glass.

11. Loss of glass bite due to shifting of glass.

12. Loss of glass bearing on setting blocks due to shifting of glass and/or blocks.

B. Warranty does not include damage caused by vandalism, or by natural conditions exceeding the performance requirements. Warranty and its enforcement shall not deprive Owner of other action, right or remedy.

C. Warranty period for entire system shall be three (3) years from date of substantial completion, unless otherwise noted; i.e. paint finish warranty. System warranty includes materials and labor.

D. Certain materials are required to have special warranties. Special warranties shall not limit or reduce requirements of system warranty. Special warranties may originate, in part or in whole, with manufacturers or fabricators and pass through Contractor to Owner. Warranties as written or interpreted by manufacturers or fabricators shall not limit or reduce special warranty requirements of this specification.

1. Painted finish on aluminum which cracks, peels, fades in excess of specified limits or chalks in excess of specified limits shall be replaced at no charge (material and labor) for minimum ten (10) year period beginning on date of manufacture. Coating manufacture shall provide written confirmation of applicator approval prior to initiation of fabrication.

2. The paint manufacturer shall provide written approval of the paint applicator and ten (10) year warranty; prior to initiation of any fabrication work.

3. Laminated glass which delaminates shall be replaced at no charge (materials and labor) for a minimum five (5) year period beginning on date of manufacture.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel:

1. Hot rolled shapes and plates shall conform to ASTM A 36.

2. Tubing shall conform to ASTM A 500 or A 501.

3. Stainless steel bars and sheet shall be AISI Type 302 or 304 and/or consistent with an FBC approved NOA (or FBC product approval) certification. Minimum thickness is: 0.062 inch for frames; 0.031 inch for trim covers; 0.012 inch for concealed flashing.

4. Non tubular cold formed carbon steel with thickness 0.168 inch or less shall conform to ASTM A 653.

B. Aluminum:

1. Acceptable alloy and temper combinations for extrusions subject to fabrication, finish and structural requirements are: 6063-T5; 6063-T6; 6061-T6. Other alloys of the 6xxx series and other tempers may be submitted for approval. Nominal wall thickness of 0.125 inch or greater is acceptable for structural extrusions; wall thickness less than 0.125 inch may be acceptable and is subject to approval. Minimum nominal wall thickness for nonstructural interior trim shall be 0.062 inch.

2. Acceptable alloy and temper combinations for sheet and plate subject to fabrication, finish and structural requirements are: 3003-H14; 5005-H14.

Other alloys of the 3xxx, 5xxx and 6xxx series and other tempers may be submitted for approval. Minimum nominal thickness is 0.04 inch for flashings and 0.125 inch for all other applications.

C. Glass:

1. For consistency of quality, appearance and performance throughout the work, glass materials shall be the product of a single manufacturer or fabricator for each kind or condition of product indicated, and shall be composed of primary glass from a single source.

2. Glass shall conform, as a minimum, to the following standards.

   a. Flat glass shall conform to ASTM C 1036, quality q3

   b. Heat-treated flat glass shall conform to ASTM C 1048, except that surface compression of heat strengthened glass shall be 3500 to 8500 PSI.

   c. Tempered and laminated glass shall conform to ANSI Z97.1.

   d. Laminated glass shall conform to ASTM C 1172.

3. Provide safety glass at the following locations.

   a. Doors.

   b. Fixed and operable glazing where nearest exposed edge of glazing is within a 24 inch arc of either vertical edge of the door in a closed position and where exposed bottom edge of glazing is less than 60 inches above walking surface.

   c. Fixed glazing and operable glazing with exposed area exceeding 9 square feet, with exposed bottom edge less than 18 inches above a walking surface, exposed top edge more than 36 inches above walking surface, with a walking surface within 36 inches horizontally of glazing; Safety glass is not required if there is a protective bar with minimum 1.5 inch width located between 34 and 38 inches above walking surface on accessible side of glazing, with bar capable of supporting a horizontal load of 50 pounds per linear foot without contacting glass.

   d. Additional locations required by code.

4. Provide heat strengthened glass where required by design pressures, anticipated thermal stress, or use in spandrel area. Provide fully tempered glass only where safety glass is mandatory or where design pressures exceed capacity of heat strengthened glass.

5. Glass Edge Quality:

   a. Annealed Face Glass:

(1) Shark teeth shall not penetrate more than half of glass thickness.

(2) Serration hackle shall not penetrate more than 10 percent of glass thickness.

(3) Flare shall not exceed 0.062 inch as measured perpendicular to glass surface across edge.

(4) Bevel shall not exceed 0.062 inch.

(5) Flake chip depth shall not exceed 0.031inch and length or diameter shall not exceed 0.25 inch.

(6) Rough chips are not permitted. Rough chips are those which exceed dimensional limits for flake chips.

b. Heat treated face glass shall have seamed edges, free from shark teeth, serration hackle, flare and chips.

6. Laminated glass shall consist of two layers of heat strengthened glass of equal thickness and DuPont Butacite or Solutia Saflex interlayer of thickness required, but not less than 0.060 inch nominal thickness.

7. In addition to conforming to ASTM C 1048, heat treated glass shall conform to the following flatness tolerances.

a. Bow and warp are defined as deviation of a glass surface from a true plane, with glass free-standing or installed in a frame and positioned in a vertical plane.

b. Localized bow refers to any straight line segment on a glass surface with length of 12 inches.

c. Overall bow refers to any straight line segment on a glass surface which extends between opposite edges and is perpendicular to at least one edge. Length of line segment is gage length.

d. Localized bow shall not exceed 0.0625 inch.

e. Overall bow shall not exceed: 0.041 inch per foot for gage length zero to 36 inches; 0.031 inch per foot for gage length 36 to 60 inches; one half of the values listed in ASTM C 1048, Table 2 for gage lengths exceeding 60 inches.

f. Where heat treating results in parallel ripples or waves, maximum peak-to-valley deviation shall not exceed 0.005 inch. Requirements for localized bow and overall bow shall also be satisfied. Direction of ripples shall be consistent throughout building and shall be parallel to the glass width edge.

g. Specified bow and ripple tolerances are intended as manufacturing quality control limits and are subject to acceptance of the glass visual mockup, if provided

h. During the manufacture and the fabrication of glass for this project, heat treated glass shall be subjected to those quality control measures recommended by the glass manufacturer to identify and to minimize inclusions within the glass which could result in spontaneous breakage. Inclusions causing spontaneous breakage are defined as material defects by this specification. Heat treated glass which experiences spontaneous breakage after installation shall be replaced (material and labor) under the provisions of the warranty for this project.

8. Insulating glass shall have double edge seals. Primary seal shall be extruded polyisobutylene continuously bonded to glass surface and to dessicant filled metal spacer, including corners. Minimum width of the primary seal shall be 0.125 inches. Secondary seal shall be silicone (GE/GS 3725 or Dow Corning 982). Secondary seal shall completely cover spacer without gaps or voids and shall be continuously bonded to both plates of glass. The insulating glass units shall have been tested in accordance with ASTM E774, and compliance with classes C, B and A shall be indicated by a permanent label (visible after installation) with a minimum height of 0.05 inches. All muffins shall be aluminum and internal to insulated glazing units; refer to drawings for muffin locations and patterns.

9. Glass types, except where otherwise mandated by Code, shall be as follows:

<u>Type #1</u> (Within 30 ft or less – of Grade)

At window walls, windows, and doors (where insulated glass is available for impact rated assemblies or other areas requiring Code - compliant large and small missile impact testing shall be glazed with, insulating laminated assemblies (of thickness required, but not less than 1-5/16 inch), made up of:

1/4 inch (minimum) match PPG Azuri at outer light, with Solarban 70XL on #2 surface
1/2 inch airspace
1/4 inch Clear H/S
.090 Interlayer per FPA/NOA
1/4 Inch Clear H/S

All lights to be heat strengthened (exterior monolithic light to be safety tempered, where code required)
(Provide 9/16” tempered laminated glass to match insulated glass at doors if insulated glass is not available for design wind loading).

D. Glazing System:

1. Window glazing system shall, at the option of the Contractor, be:

a. Option #1, a dense gasket against one face and a cellular gasket against the other glass face.

b. Option #2, a dense gasket against the interior glass face and a recessed compatible spacer with a continuous silicone cap seal against the exterior face.

2. At locations which are, by Code, subject to impact resistance criteria and testing, provide a continuous interior cap bead of silicone, or other method as may be approved, to assure the retention of glass within the framed opening.

3. All low “E” coatings shall adhere to glass surfaces in order to ensure that edge deletion does not occur for the life of the glass assembly.

4. All glass will be manufactured and fabricated domestically, unless written approval is given by the Owner and the Architect as part of the preliminary product approval.

E. Elastomeric Gaskets, Weatherstrips and Blocks:

1. Gaskets and weatherstrips:

a. Cellular gaskets shall be extruded black neoprene or EPDM with a hardness of 40 +/- 5 durometer Shore A and conforming to ASTM C509, flame propagation test not required. Design cellular gaskets to provide 20 to 35% compression.

b. Dense gaskets shall be black extrusions (neoprene, EPDM or silicone) with a Shore A hardness of 75 +/- 5 for hollow profiles and 60 +/- 5 for solid profiles, and conforming to ASTM C1115, Type C or to ASTM C 864.

c. Injection mold corners of all exterior gaskets unless shown to be incompatible with the installation procedures.

d. Gaskets shall be designed to produce glass edge pressure of 4 to 10 pounds per linear inch.

e. All gaskets shall be UV resistant.

2. Silicone gaskets and sheet, where used to absorb movements at framing expansion joints, shall conform to ASTM C 1115, Type T

3. Gaskets and weatherstrips shall have a continuous spline or a continuous groove engages a matching groove or leg on the aluminum frame

4. Setting Blocks:

   a. Setting blocks shall be dense extruded neoprene, silicone or EPDM with hardness of 85 +/- 5 durometer Shore A, minimum length of 4 inches and minimum width corresponding to glass thickness. Setting blocks shall be equidistant from glass centerline (location of setting blocks at quarter points is acceptable). Distance from vertical glass edge to nearest edge of setting block shall not be less than six inches (or 0.125 times glass width, whichever is greater). **PVC setting blocks will not be acceptable.**

   b. Shims used in conjunction with setting blocks shall be of the same material, hardness, length and width as the blocks.

   c. Setting blocks and chairs shall be secured against migration.

5. Side Blocks:

   a. Provide side blocks at both jambs, between mid-height and top corner of glass. Blocks shall be 55 +/- durometer Shore A dense neoprene, silicone or EPDM. Block width shall be 0.125 inch less than nominal glass edge clearance.

   b. Side blocks are not required where glass is continuously sealed with silicone at two or more edges

F. Anchors in Concrete and Masonry:

1. Anchors embedded in concrete and masonry shall be prime painted rolled steel, or hot dip galvanized cold formed steel.

2. Strength of embedded anchors shall be developed by integral projections, welded deformed bars, or headed studs.

3. At masonry, through bolts are acceptable provided that bearing plates are used at both masonry surfaces. Expansion bolts are acceptable provided they are designed for use in masonry.

4. Expansion bolts are acceptable at concrete.

5. Self drilling, self threading screws are not acceptable. Screws in plugs and powder actuated fasteners are not acceptable.

G. Fasteners:

1. Fastener requirements are applicable to screws, bolts, nuts, washers, rivets and pins.

2. Fasteners shall comply with FBC approved NOA certification and cut-sheets or documentation shall be provided to Architect.

3. Stainless steel fasteners (alloy type 302 or 304 only), or aluminum fasteners if acceptable to manufacturer, are required at the following locations, and are acceptable at all locations:

   a. Locations with exposure to outdoor air

   b. Joinery of aluminum frames, regardless of exposure

   c. Glazing pockets

   d. Internal cavities that act as gutters, or that may potentially contain water resulting from leakage or condensation

4. Carbon steel fasteners with zinc plating or cadmium plating are acceptable at other locations; with silicone sealant encapsulation at locations where fasteners will be subject to corrosion if primary sealant joint fails, and when approved in writing by the Architect and the Owner.

5. Provide lock washer or other locking device at all bolted connections.

6. Powder actuated fasteners are not acceptable.

H. Shims:

1. At connections subject to movement, separate moving surfaces with friction reducing pads. Pads shall have minimum 0.062 inch thickness, shall sufficiently reduce friction to permit movement, shall be resistant to wear, and shall be positively retained in position (open ended slots are not acceptable). Pads shall not be subjected to heat damage from welding or cutting, or to excessive pressure from overtightening of bolts.

2. Shims which transfer shear forces (tending to slide one shim against another) shall be steel plates, set in a staggered pattern and fillet welded to each other and to adjacent steel surfaces. Shims and welds shall be structurally designed to support applied loads.

3. Plastic shims are acceptable at static connections for which shims transfer only compressive forces.

4. Wood shims are not acceptable.

I. Weep hole filters shall be 20 to 45 pore per inch PVC coated open cell urethane foam.

J. Sealants:

1. Acceptable products (subject to tests) for seals to substrates other than stone are: Dow Corning 790, 795 and 995. A primary and secondary perimeter seal shall be provided at the jamb, head end sill of framed assemblies abutting masonry or concrete surfaces.

2. Data sheets for and samples of other sealants may be submitted for approval. Oil base sealants are not acceptable.

3. Sealant back-up materials shall be closed cell, non-gassing and non-absorptive. Acceptable materials include: polyethylene foam, urethane foam or extruded silicone as recommended by sealant manufacturer. Back-up shall not absorb water.

4. Coordinate with other sections to assure compatibility of intersecting sealants, and that porous or stone materials shall not be stained.

K. Primers:

1. Coat aluminum surfaces in contact with masonry, concrete or unpainted steel with prime paint (non-wetted only) or bituminous paint (wetted areas) where required.

2. Prime paint steel parts of anchors, embedded anchors, exposed reinforcement and supports. After field welding, remove weld slag and touch up primed surface.

3. Provide minimum dry film thickness of one mil for paint and 30 mils for bituminous paint. Prime paint shall conform to GSA specification TT-P-645. Bituminous paint shall conform to SSPC-Paint 12.

L. Product Source:

1. Solely for the purpose of designating type and quality for the work described in this section, drawing details and specifications are based upon the products of YKK AP America or approved equal. Upon written request and submission of preliminary submittal requirements, alternate products will be reviewed for acceptance by the Architect.

2. For consistency of quality, appearance and performance throughout the work on window walls, windows, and operating hardware shall be the product of a single manufacturer or fabricator for each kind or condition of product indicated.

M. Window Wall Framing:

1. Where required to comply with structural design criteria, aluminum framing shall be YKK AP 50FI Impact Resistant Storefront System with insulated glass or approved equal, including product(s) by Sun Metal Systems, PGT, Inc., EFCO Corporation; a Pella Company, fitted to receive glass types shown and specified. It shall be adapted to the adjacent building construction and shall be anchored and reinforced as required to withstand specified impact and design wind loads.

2. Segmented aluminum framing shall be YKK AP America YHS 50 FI or approved equal, including product(s) by Sun Metal Systems, PGT, Inc., EFCO Corporation; a Pella Company, or YKK AP America, modified to suit hardware and glazing conditions shown and shall be provided with full length spliced and sealed flashed sill, installed and sealed water-tight to the adjacent building structure prior to the installation of framing and glazing work and shall be anchored and reinforced as required to withstand specified design wind loads. All Fixed systems shall have FPA/NOA extruded sill pan.

N. Windows: Fixed windows shall be YKK AP America 50 FI (non-thermal) or approved equal, including product(s) by PGT, Inc., EFCO Corporation; a Pella Company.

1. Comply with Glazing System requirements

2. Required test specimen size is largest size for this project, not the size required by AAMA/NWDA 101/1.S.2.

3. Locks and strikes shall be type 302 or 304 stainless steel or white bronze. Provide, at a minimum, cam locks with handles and strikes per vent, in compliance with NOA certification and FBC approvals.

4. Vent frames shall be extruded tubular aluminum not less than 2 inches in depth. Tube perimeter shall be continuous aluminum and shall not be interrupted by a thermal break.

5. Weather strips shall have a continuous spline engaged in a continuous groove in the frame.

6. Balance arms shall be four-bar stainless steel type 302 or 304 with adjustable friction shoe. Provide two balance arms per vent.

7. Provide two limit stops per vent. Material shall be 302 or 304 stainless steel. Stops shall restrict clear opening to four inches and shall provide for deactivation by the Building Custodian to allow screen removal/installation

O. Entrance Doors: Glazed entrance doors for manual-swing operation shall be YKK AP American 50H Entrances or approved equal, including products by PGT, Inc., EFCO Corporation; a Pella Company.

1. Door Construction: Monumental; 2-1/4-inch overall thickness, with minimum 0.125-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
2. Door Design: As indicated Wide stile; 5-inch nominal width.

a. Bottom Rail with weatherstrip; 10-inch nominal height.
b. Accessible Doors: Smooth surface for width of door in area within 10 inches above floor or ground plane.

3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.

    a. Provide nonremovable glazing stops on outside of door.

P. Entrance Door Hardware:

1. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door to comply with requirements in this Section. The door hardware shall be provided in accordance with the manufacturer's Florida Product Approval testing criteria or provided with an Engineered Assessment Report per the Florida Building Code.

    a. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated.
    b. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
    c. Opening-Force Requirements:

        1) Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion and not more than 15 lbf to open the door to its minimum required width.
        2) Accessible Interior Doors: Not more than 5 lbf to fully open door.

2. Opening-Force Requirements:

    a. Latches and Exit Devices: Not more than 15 lbf required to release latch.

3. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305, as specified in Division 8 Section "Door Hardware."
4. Cylinders: As specified in Division 8 Section "Door Hardware."
5. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing. Electric Access controls with CVR's shall be provided at doors scheduled to be "secured" or electrically access controlled.
6. Weather Stripping: Manufacturer's standard replaceable components.

    a. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.

7. Silencers: BHMA A 156.16, Grade 1.

Q. Accessory Materials:

1. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 7 "Caulking and Sealants."

2. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil thickness per coat.

R. Concealed Flashing:

1. Acceptable materials are neoprene or silicone (type “T” only) sheet, stainless steel sheet and mill finish aluminum sheet. Minimum thickness for flashing is 0.062 inch for neoprene or silicone, 0.012 inch for stainless steel, and 0.040 inch for aluminum. Aluminum, where in contact with dissimilar materials, is required to have a bituminous coating.
2. Provide sealed interior glass stops, flashing adapters, and gutters with sealed lap joints, end dams and transitions or fully welded joints where required to assure control and drainage of infiltration to gutters.

2.2 FABRICATION

A. As far as practicable, fabrication, glazing and assembly shall be completed in the shop.

B. Exposed work shall be carefully matched to produce continuity of line and design. Joints in exposed work, unless otherwise shown or specified, shall be accurately fitted and rigidly secured. Remove burrs from cut edges. Ease corners and edges.

C. Except where otherwise shown, specified or directed, method of assembly and joining shall be at manufacturer's discretion as shown on the approved shop drawings.

D. Welding shall be in accordance with recommendations of the American Welding Society and shall be done with electrodes and by methods recommended by suppliers of alloys being welded. Welds behind finished surfaces shall be done as to minimize distortion and/or discoloration on finished side. Weld spatter and welding oxides on finished surfaces shall be removed by descaling and/or grinding.

E. Unless otherwise shown or specified, weld beads on exposed surfaces shall be ground and finished to match and blend with finish on adjacent metal. Grinding and polishing of nonferrous metal shall be done only with clean wheels and compounds free from iron and iron compounds. Soldering and/or brazing are not acceptable.

F. Provide exposed fasteners only where shown on approved shop drawings. Exposed fasteners shall be countersunk. Fastener heads shall be finished to match fastened material and shall be sealed or gasketed as required to prevent water entry.

G. Provide specified finishes on exposed surfaces. Provide specified galvanized finish on all concealed carbon steel parts or reinforcements potentially exposed to water infiltration.

H. Sealant work performed in the shop shall be done in strict conformance with the sealant manufacturer's written instructions. Excess sealant in visible areas shall be cleaned off immediately upon completion of assembly work and prior to shipment.

I. Aluminum-Framed Entrances:

1. Form or extrude aluminum shapes before finishing.
2. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld splatter and welding oxides from exposed surfaces by descaling or grinding.
3. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

    a. Profiles that are sharp, straight, and free of defects or deformations.
    b. Accurately fitted joints with ends coped or mitered.
    c. Means to drain water passing joints, condensation within framing members, and moisture migrating within the systems to exterior.
    d. Physical and thermal isolation of glazing from framing members.
    e. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
    f. Provisions for field replacement of glazing.
    g. Fasteners, anchors, and connection devices that are concealed from view to greatest extend possible.

4. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
5. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
6. Storefront Framing: Fabricate components for assembly using head-and-sill-receptor system with shear blocks at intermediate horizontal members.
7. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

    a. At exterior doors, provide compression weather stripping at fixed stops.
    b. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

8. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

    a. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
    b. At exterior doors, provide weather sweeps applied to door bottoms.

9. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

10. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

J. Aluminum Sun Shades:

1. Basis of Design
   a. Curtain Wall System: YKK AP ThermaShade® Aluminum Sun Shade System, or Architect approved equal.
2. Sun Shade System:
   a. Description: All structural components and attachment hardware shall be concealed.
   b. Thermally improved anchor: Sunshade anchor must provide a continuous thermal barrier by means of a poured and debridged pocket consisting of a two-part, chemically curing high density polyurethane which is bonded to the aluminum. Anchors employing non-structural thermal barriers are not acceptable.
   c. Style: Wedge Outrigger with wedge fascia, with 6’ airfoils, with concealed anchors, 30-inch projection with internal subframe integral with the store front system.
3. **MATERIALS**
   a. Extrusions: ASTM B 221 (ASTM B 221M), 6063-T5 and 6063-T6 Aluminum Alloys.
4. Manufacturer’s Standard Accessories:
   a. Fasteners: AISI 300 series stainless steel fasteners.
5. Shop Assembly: Fabricate and assemble units with joints only at intersection of aluminum members with hairline joints; rigidly secured, in accordance with manufacturer’s recommendations.
6. Finish to Match Storefront

2.3 TOLERANCES

A. Tolerances in current edition of Aluminum Association "Aluminum Standards and Data" are applicable to finished, fabricated and assembled materials, except that flatness tolerance for aluminum sheet panels shall be half of standard sheet tolerance. Maintain stricter tolerances where required for proper fit of components.

2.4 ALUMINUM FINISH

A. General Requirements:

1. Exposed aluminum surfaces shall be finished with a factory oven cured finish. Paint shall be supplied by a licensed formulator.

2. Application of finish shall be performed under specifications issued by licensed formulator, by an applicator specifically approved by formulator.

3. Color shall be custom color to be adonized aluminum or “Bone White or” for frames and sun shades to match Owner's sample. Samples submitted for approval shall show extremes of color range.

3. Pretreatment of metal surfaces shall be done in accordance with procedures recommended by formulator.

5. Field touch-up of painted aluminum is permitted only with written permission from the Architect. Unless such touch-up is authorized, replace damaged material with new material.

B. Outdoor Surfaces:

1. Painted aluminum finish shall be an electrostatically applied high performance powder coating complying with AAMA 2605 and based on PPG's "Kynar" coating system or approved equal.

2. Pigmented organic coatings for extrusions, structural shapes, sheet or plate, spray applied in the factory, shall meet requirements of AAMA 2605.

3. Exterior exposed aluminum surfaces shall be finished with a factory oven cured three coat (minimum) finish based on Kynar 500 or Hylar 5000 fluoropolymer resin. Formulation shall have at least 70% Kynar 500 or Hylar 5000 resin in residual solids.

4. Pigmented organic coatings for extrusions, structural shapes, sheet or plate, spray applied in the factory, shall meet the requirements of AAMA 2605 for basis of design Kynar coating system.

5. Warranty:

a. Color changes shall not exceed 5E NBS units as defined by ASTM D 2244 for the specified special warranty period.
b. Chalking shall not exceed a number 8 rating as defined by ASTM D 4214.
c. Paint film shall not crack or peel during the specified special warranty period.
d. Coating manufacture shall provide written certification that the applicator is approved in order to provide a ten (10) year warranty for the coating.
e. Anodized Finishing shall be a minimum of AAMA 612, meeting warranty of 10 years

6. Adonized Finishing: Prepare aluminum surfaces for specified finish; apply shop finish in accordance with the following:

a. of AAMA 612. Aluminum extrusions shall be produced from quality controlled billets meeting AA-6063-T5.
b. Exposed Surfaces shall be free of scratches and other serious blemishes.
c. The anodized coating shall comply with all of the requirements of AAM 612: Voluntary Specifications, mortar, salt spray, and chemicals commonly found on construction sites, and to resist the loss of color and gloss.
d. Overall coating thickness for finishes shall be a minimum of 0.7 mils.

C. Indoor Surfaces:

1. Specified finish for outdoor surfaces is acceptable for indoor surfaces.

2. Where outdoor and indoor parts can be finished separately, factory oven cured acrylic or polyester paint is acceptable for indoor surfaces.

3. Acrylic and polyester pigmented organic coatings for extrusions, structural shapes, sheet or plate, spray applied in the factory, shall meet requirements of AAMA 2604.

2.5 STEEL FINISHES

A. Cold formed carbon steel with thickness 0.168 inch or less shall be hot dip galvanized to meet or exceed requirements of classification G 90 of ASTM A 653.

B. Cold formed carbon steel with thickness exceeding 0.168 inch and hot rolled steel shall be prime painted in accordance with GSA specification TT-P-645 or hot dip galvanized in conformance with ASTM A 123

C. Concealed carbon steel reinforcement potential exposed to water infiltration shall receive hot dip galvanized finish in conformance with ASTM A123.

D. After fabrication of painted steel, all cut ends and holes shall be degreased and prime painted. Galvanized finish shall be applied after fabrication.

2.6 SOURCE QUALITY CONTROL

A. Adhesion, Compatibility and Stain Tests

1. Provide to sealant manufacturers samples of all substrates which are in contact with sealant, regardless of whether adhesion must be achieved.

2. For substrates which must support adhesion, submit for record only sealant manufacturers' reports of adhesion tests conducted in accordance with ASTM C 794. Metal screen is an acceptable substitute for airplane cloth.

3. For substrates which are in contact with sealant, submit for record only sealant manufacturers' reports of compatibility tests for sealants and primers conducted in accordance with ASTM C 1087.

B. Inspect materials and workmanship to assure compliance with Contract Documents. Provide access to storage and manufacturing facilities for observation by Owner and Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, prior to start of work, that structure and site conditions are ready to receive work of this section. Establish offset lines and bench marks as required for this purpose and for installation.

1. Verify location, alignment and position of embed anchors installed by others.

2. Verify that concrete openings into which work by this contractor is to be installed are level, square and sized to allow this work to proceed in accordance with the approved drawings installation tolerances specified herein.

3. Notify the General Contractor in writing of any openings which do not comply with requirements specified below.

3.2 INSTALLATION

A. Install materials in accordance with approved drawings. Provide labor, material, equipment and supervision necessary for complete installation.

1. Glass installation shall comply with GANA (Glass Association of North America) “Glazing Manual” except as specifically recommended otherwise by the glass manufacturer.

2. All framing joints shall be accurately and securely fitted and properly sealed for a weather-tight installation. All cut and machined ends and recesses shall be true, accurate and free of burrs and rough edges.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 7 Section “Caulking and Sealants” to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Tolerances:

1. Provide anchor adjustment capability for full range of specified tolerances for building structure.

2. Work of this section shall be within the following tolerances.

a. Deviation from plumb, level or dimensioned angle shall not exceed 0.125 inch per 12 feet of length of any member, 0.25 inch in any total run in any line.

b. Deviation from theoretical position in plan or elevation, including deviation from plumb, level or dimensioned angle, shall not exceed 0.375 inch total at any location. Change in deviation shall not exceed 0.125 inch for any 12 foot run in any direction.

c. Maximum offset from true alignment between two consecutive members placed end to end shall not exceed 0.062 inch.

d. Maximum offset between glass framing members at corners of glazing pocket shall not exceed 0.031 inch.

G. Anchorage:

1. Anchor component parts by bolting and welding. Install slip pads between moving parts in accordance with FBC - NOA certification or manufacture's requirements.

2. Provide non-corrosive separators between dissimilar materials.

3. Perform field welding in accordance with AWS standards. Prepare surfaces as specified for shop welding. Remove weld slag and apply prime paint over welds. Prime paint exposed portions of embedded anchors. Touch up shop applied primer that is damaged by welding or other causes. Do not perform welding where discoloration or other damage would result on exposed surfaces, including glass and finished metal.

4. Where slots or oversize holes are provided for adjustment only, secure connection after final adjustment. Interlocking serrations in extruded aluminum brackets and washers are acceptable. Steel weld washers with 0.25 inch minimum thickness are acceptable with steel brackets. Special washers or nuts which rely on friction and/or surface indentation of fastened part are not acceptable.

H. Internal Gutters and Drainage:

1. Seal water and air tight all interior joints between window framing members and glazing adapters or removable glass stops, in accordance with FBC - NOA (or FBC product approval) certification or manufacture's requirements.

2. Provide and install flashed sill gutters at all window walls and at windows where shown or where required by specification, or compliance with FBC - NOA (or FBC product approval) certification or manufacture's requirements. Sill gutters shall be installed with integral end dams at each jamb.

3. Flashed gutters shall be continuous for the full length of each building structure opening and fitted with permanently sealed splice joints where required. Gutter shall slope to drain to exterior and shall be closed at ends with metal closures shop welded or mechanically attached and sealed to the gutter assembly, in accordance with FBC - NOA (or FBC Product Approval) certification or manufacture's requirements.

4. End closures for the flashed sill gutters shall be fully weather sealed (front to back depth of gutter) to adjacent building structure. Weather seal shall direct all infiltration, including drainage from adjacent building elements, into the flashed sill gutter for drainage to the exterior, in accordance with FBC - NOA (or FBC product approval) certification or manufacture's requirements.

5. Remove any temporary shims and fasteners, leaving all moving joints free to accommodate building movements as designed.

I. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points:

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturer’s written instructions using concealed fasteners to greatest extent possible.

K. Install perimeter joint sealants as specified in Division 7 Section “Caulking and Sealants” to produce weathertight installation.

K. Clean surfaces to be sealed. Install backers, primers and sealant in accordance with drawings, test results and manufacturer recommendations. Tool sealants as a separate operation after application. Immediately remove masking.

3.3 GLAZING

A. Inspect frame for proper dimensions, square, freedom from obstructions within glass pockets, and proper joinery seals and drainage provisions. Adjust frame and/or glass size as required to meet specified requirements.

B. Clean glazing pocket before setting glass. Solvents shall be compatible with finished aluminum, glass and glazing materials. Setting blocks shall be provided at all lights, including doors, and shall be equidistant from glass centerline. Location of setting blocks at glass quarter points is acceptable. Distance from vertical glass edge to nearest edge of setting block shall not be less than six inches, or 0.125 times glass width, whichever is greater. Side blocks shall be located between mid-height and top corner of glass. Side blocks, setting blocks and chairs shall be positively retained in position.

C. Install gaskets with injection molded corners on exterior (and interior where practicable). Where gasket corners cannot be molded, provide excess gasket lengths as required for “crowd in” of gasket to assure permanently tight corners. Tightly butt ends of gaskets and seal all non-molded gasket corners with compatible sealant. Gasket joints shall not occur at locations other than corners.

D. Inspect glass before installation. Glass not conforming to specification shall not be installed. Replace any glass lights broken or damaged on face or edge surfaces.

E. Except as otherwise specified, comply with GANA Glazing Manual. Provide minimum nominal glass bite of 0.5 inch. Where designed joint movement will result in variable glass bite, increase nominal bite to provide not less than 0.375 inch bite and not less than 0.25 inch minimum edge clearance under full range of specified movements.

F. Remove and replace stops and apply sealants at joints as required for complete and water/air tight glass installation.

G. Coordinate sequencing of glazing with General Contractor and defer glazing of openings obstructed during construction. Glaze such openings when obstructions are removed.

3.4 FIELD QUALITY CONTROL

A. Field Check for Water Leakage:

1. Method for field check for water leakage shall be by "static pressure" box test (modified AAMA 502) at a pressure of 8 PSF. There shall be no unacceptable water leakage as defined herein. Refer to procedures outlined below for specific testing criteria.

2. The water leakage field check and sealant adhesion tests shall be monitored by an independent testing agency approved by the Architect and Owner.

3. Provide powered scaffold, hose, water supply, test enclosure, instrumentation and manpower to perform at least two successful groups of tests, plus repeat of any unsuccessful tests. The test areas shall be selected by the Architect and shall be completely representative of the intended construction, including all operating hardware, locks, handles, perimeter sealants, and surrounding construction.

4. Initial water testing shall be conducted within 1 week of start of glazing. Construction sequence shall be accelerated, where necessary, to allow for timely completion of any surrounding areas affecting the conducting of this initial test. General Contractor and Glazing Subcontractor shall advise Architect, approved testing agency, Owner, and glazing consultant in writing when installation testing shall be conducted only when a floor area of the building is completed and ready to be tested, test area shall be randomly selected from the competed work area. Scheduling of the testing shall be conducted so as to not to delay construction and within an adequate time to identify any problem area with window wall installation.

5. Remedial measures, if required as a result of these tests, shall be subject to approval prior to installation, shall be applied to all previously installed work and shall maintain the standards of quality and durability for the project. A third group of tests may be required if, in the opinion of the Architect, necessary to verify the maintenance of quality. Costs of all such tests, and remedial action (if necessary) are the responsibility of the contractor.

B. Field test for sealant adhesion: Periodically test sealants in place for adhesion, using methods recommended by sealant manufacturer. Promptly replace any sealant failing to adhere or to cure.

C. Field test for wall drainage gutter:

1. Where applicable, test the internal gutters on the initial two floors by temporarily plugging the weeps and filling the gutters with water to a depth of about 2 inches. After not less than 15 minutes, inspect the gutters for leakage.

2. Correct any deficiencies observed and retest until successful tests are achieved. If deficiencies occur, continue testing 100% of the gutters until at least one complete floor has been tested without failure.

3. Continue testing at the rate of not less than 10% of all gutters, randomly selected. If deficiencies recur, resume test program as described.

D. Field test performance criteria for assembly:

1. The Contractor and window manufacturer and/or installer shall complete the work and prepare an area of the building to be tested, which shall be a minimum of one floor level representative of the project conditions. Testing will not be conducted without written notification in accordance with Part 3 of this specification that the test area is ready for field testing from the Contractor.

2. Test Sequence:

a. Water infiltration under static pressure (10 PSF).

3. Condensation is acceptable during water infiltration tests. Water leakage is acceptable only if all of the following conditions are satisfied: (a) water is contained and drained to exterior; (b) there is no wetting of a surface that would be visible to building occupants; (c) there would be no staining or other damage to completed building or its furnishings. This definition of water leakage governs over any other definition appearing in referenced documents.

4. Where test sequence or test failure requires successive water infiltrationtests, the only means used to drain water from internal cavities shall be gravity drainage through weep system for a minimum of 15 minutes. Air pressure, removal of parts or other means of draining water shall not be used.

5. Static water infiltration test shall conform to ASTM E 331. Differential test pressure shall be 10 PSF. There shall be no unacceptable water leakage as defined herein. Sources of water leakage shall be identified.

3.5 ADJUSTMENT

A. Adjust operating components for proper fit within fixed frame.

B. Adjust weather-strips for continuous contact and seal in closed position.

C. Adjust hardware for proper operation.

D. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.

1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch, measured to the leading door edge.

3.6 MAINTENANCE - REPLACEMENT

A. Provide Owner glazing details applicable to replacement glass, with outline of procedure for glass replacement.

3.7 PROTECTION AND CLEANING

A. Protect materials against damage and contamination. Maintain installed work in reasonably clean condition and clean surfaces as required to remove dirt, stains and corrosive substances, during and at conclusion of construction.

B. Periodically remove from the site debris, excess materials and unused tools and equipment resulting from this work. At conclusion of construction, leave premises in clean condition.

END OF SECTION 08905

SECTION 09110 – METAL FURRING AND LATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes metal furring and lathing for portland cement plasterwork.

B. Furnish all labor, materials, tools, equipment, etc. and services necessary and incidental to the complete fabrication, furnishing and erection of this Section as shown, noted, detailed, necessary and reasonably implied on the drawings and in the specifications.

C. Related Sections:

1. Division 7 Section “Weather Barriers” for secondary weather/vapor barrier at framed and lath stucco assemblies.
2. Division 9 Section “Portland Cement Plaster (Stucco)” for exterior portland cement plasterwork (stucco).
3. Division 9 Section “Gypsum Board Assemblies” for interior gypsum board assemblies.
4. Division 6 Section “Miscellaneous Carpentry” for exterior sheathing.

1.3 SUBMITTALS

A. Submit product data under provisions of Division 1 Section “Submittal Procedures.”

B. Submit properly identified manufacturer's literature including material specifications for each product specified, installation recommendations and other data as may be required to show compliance with the specifications.

C. Manufacturer's certificate that materials meet specification requirements.

D. Submit Quality Assurance data per Article 1.4, this Section and Certification per Article 1.3e, this Section.

E. For furred / suspended ceiling areas subject to wind uplift, provide the following:

1. Submit shop drawings showing complete information for fabrication and installation of furred/suspended ceiling area framing. Indicate

dimensions, location, size, spacing and gauge.

2. Provide installation layout including location and details of anchorage devices to be embedded in other construction.
3. Fabricate elements to limit finish surface deflection to L:360.
4. Wind pressures act perpendicular to flat surfaces, regardless of surface orientation. Wind pressures act perpendicular to tangents of curved surfaces. At corners and changes in plane, adjacent surfaces shall be assumed to experience the worst case combination of inward pressure simultaneously, outward pressure simultaneously, and simultaneous occurrence of inward pressure on one surface and outward pressure on adjoining surface.
5. Provide manufacturers complete design calculations and shop drawings signed and sealed by a professional engineer registered in the State of Florida.

1.4 QUALITY ASSURANCE

A. This subcontractor shall have been engaged with the installation of metal furring, and performed this work in at least three (3) projects equal in scope to this work.

1.5 CODES AND STANDARDS

A. Comply with applicable requirements of governing codes and authorities.

B. Perform Work in accordance with the following standards:
1. ASTM C841 - Standard Specification for Installation of Interior Lathing and Furring.
2. ASTM C847 - Standard Specification for Metal Lath.
3. ASTM C926 - Standard Specification for Portland Cement-Based plaster (stucco).
4. ASTM C933 - Standard Specification for Welded Wire Lath.
5. ASTM C1063 - Standard Specification for Installation of Lathing and Furring for Portland Cement-Based Plaster.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Sections 01600 and 01620.

B. All materials shall be delivered and stored per manufacturer's instructions.

PART 2 - PRODUCTS

2.1 PROTECTIVE FINISHES

A. Exterior Work: Galvanize all metal lath, furring and steel studs including hangers unless otherwise shown or specified.

B. Where shown or specified to be galvanized, fabricate metal lath, furring, and

steel studs from galvanized sheet steel complying with ASTM A525. Galvanize inserts, hangers and channels by the hot-dip process in compliance with ASTM A123.

C. Materials specified by weight do not include the weight of protective finishes.

2.2 FURRING MATERIALS

A. Rolled Steel Channels:

1. Hot or cold-rolled type with a minimum weight per thousand L.F. of not less than the following: 300 lbs. for 3/4" size, 475 lbs. for 1-1/2" cold-rolled, and 1120 lbs. for 1-1/2" hot-rolled size.

2.3 ATTACHMENTS AND FASTENERS

A. Hangers:

1. Wire, of rigid steel of the type and minimum size (10 gauge) or as required to comply with the requirements of ANSI 641, ASTM C841, for the maximum ceiling areas to be supported in the work.

B. Wire Ties:

1. Soft annealed galvanized steel wire, not less than 16 gauge for tying furring channels to runner channels, and not less than 18 gauge for other ties.

C. Fasteners:

1. Fasteners shall be corrosion resistant of size, length and type as recommended by manufacturer.

2.4 METAL LATH

A. Metal lath shall be Self-furring expanded metal lath with staggered indentations spaced 3-1/2" apart horizontally and 2" apart vertically with indentations of depth to hold lath a minimum of 1/4" away from back-up material. Lath shall weigh 3.4 pounds per square yard.

B. Metal lath to be used where supports are spaced not more than 16" on centers shall be expanded metal lath and weighing 3.4 pounds per square yard. Metal lath to be used where supports are spaced over 16" on centers shall be expanded metal lath stiffened with 3/8" ribs spaced 4" on center, weighing 3.4 pounds per square yard.

C. Asphalt paper-backed metal lath shall be 3.4 pounds per square yard, diamond mesh lath factory bonded on the back with asphalt impregnated paper, conforming to Federal Specification UU-B-790a; Type 1, Grade D.

2.5 ACCESSORIES

A. For all metal and rigid PVC plaster (stucco) accessories see Section 09180 of these specifications.

B. For secondary vapor barrier (in addition to felt backed lath) provide Dupont's Tyvek commercial wrap system, or approved equal, for all framed and metal lath assemblies. Refer to Section 07250 – Weather Barriers.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. All items in this Section shall be installed by experienced skilled mechanics in the best workmanlike manner and in this trade's best standard practice, plumb, square, level, true and in strict accordance with manufacturer's printed instructions.

3.2 INSTALLATION

A. Metal Furring:

1. Provide metal furring where shown, as specified, and as required to provide support for plaster bases. Where size and spacing of furring members is not shown for support of lath, do not exceed the maximum requirements of ASTM C841 for the type of lath to be used in the work. Where control or expansion joints are shown, provide separate supports on each side of joint. Do not bridge joints with metal furring.
2. Attach metal furring channels vertically, spaced 16" o.c. to masonry or concrete surfaces with hammer-set or power driven fasteners or concrete stub nails staggered 24" o.c. on opposite flanges.

B. Suspended ceilings:

1. Provide complete engineered suspension systems, including hangers, attachments, main runners and cross-furring. Use components of the sizes and locate at the spacings required by ANSI A42.4 for the maximum ceiling areas to be supported, unless otherwise shown or specified.
2. Suspend hangers for structural supporting members or intermediate framing members only by attaching to metal clips designed for the type of member involved, or where possible by looping and wire-tying directly to members. Secure to concrete by wire-tying to cast-in-place hanger wires or hanger inserts, installed prior to placing of concrete. Advise concrete installer of specific requirements for his placement of wire hangers or inserts.
3. Provide extra hangers within 6" of end of main runners and as required to support light fixtures, ceiling diffusers and grilles, access panels and other items resting in or on the ceilings. At control or expansion joints, provide extra hangers as required to support discontinuous runners.

4. Support main runners from hangers by saddle tying wire hangers to runners, or wrapping rod hangers around runners. If flat steel hangers are used, bolt hangers to channels or bend around runner and bolt to hanger above runner, using 3/8" stove bolts.
5. Locate main runners within 6" of parallel walls to support ends of cross-furring.
6. Locate cross-furring perpendicular to main runners and not more than 2" from parallel walls. Attach to main runners at each intersection with not less than 16 gauge wire or a double strand of 18 gauge wire.
7. Do not abut runners or furring into masonry or concrete construction; allow no less than 1" clearance between such construction and ends of runners or furring.
8. Splice main runners and furring channels by overlapping (with flanges of channels interlocked) and wire tie each end of splice with not less than double loops of 16 gauge wire. Overlap not less than 12" for main runner splices and not less than 8" for cross-furring splices. Provide additional ceiling framing as required to form openings and to frame openings. Coordinate support framing with the work of other trades.
9. At control or expansion joints, provide discontinuous lap in main runners occurring over joints. Do not bridge joints with cross-furring, provide furring to support each side of joint.

C. Suspension Systems for Metal Lath Applications:

1. Provide 1-1/2" cold-rolled steel channels to comply with the applicable requirements of ASTM C841 for sizes and spacing of components used in the work, unless otherwise shown. Space 3/4" channel cross-furring not to exceed the maximum span requirements of ASTM C841 for the type and weight of metal lath to be supported in the work.

D. Metal Lath:

1. Use metal lath of the type and weight required to comply with the maximum support spacing requirements of ASTM C841 and ASTM C847 for the various applications required in the work. Provide intermediate metal furring supports to reduce distance between supports to maximum permissible spans, as required.
2. Provide self-furring lath where shown and where plaster is to be applied over solid surfaces which do not provide adequate mechanical or chemical bond.
3. Apply lath with long dimension at right angles to supports, unless otherwise specified. Where ribbed or sheet type laths are used, apply with projections against supports.
4. Attach lath to supports in accordance with the requirements of ASTM C841 for the kinds of supports shown, but do not exceed 6" o.c. spacing between attachments.
5. Lap sides of diamond mesh not less than 1/2". Nest edge ribs of ribbed lath except flat-rib lath (1/8" ribs) may be lapped 1/2" in lieu of nesting ribs. Locate all end laps over supports and lap not less than 1". Stagger end laps over different supports wherever possible. Wire tie side laps at

intervals not to exceed 9" o.c. and lace end laps occurring between supports.

6. At internal corners, butt lath at vertex of angle and reinforce with cornerite strip reinforcing. Wire the cornerite to lath along edges at not more than 12" o.c. Where diamond mesh metal lath is used, cornerite may be omitted if lath is not less than 6" down partitions/walls; at vertical internal angles, extend bent lath to not less than one support away from corner.
7. Where lath abuts load-bearing walls or partitions, structural columns, or structural decks or ceilings, terminate lath to allow for casing bead isolation joint between plaster and abutting surface.
8. Where control or expansion joints are shown, terminate lath on each side of joint. Do not bridge joints with lath.
9. Extend lath eight (8) inches minimum, across concrete block and concrete beam and concrete block and concrete column joints.
10. At corners of openings provide metal lath "Butterflies" at 45 degree angles to corners.
11. Paper-backed metal lath shall be installed at exterior frame walls, ceilings, columns and where indicated, shown or called for on the drawings. Provide second under or base layer of vapor barrier, “Tyvek” or approved equal to all framed and lath stucco assemblies.

E. Accessories: For location and installation of accessories see Section 09180.

3.3 CLEANING

A. The Contractor shall be responsible for keeping all working areas clean of his materials and kept stacked and/or stored in a neat orderly dry manner during the work.

3.4 MATERIAL AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and be replaced with new material in the best workmanlike manner at NO EXTRA COST to the Owner.

END OF SECTION 09110

SECTION 09180 - CEMENT PLASTER - STUCCO

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Furnish all labor, materials, tools, equipment, etc. and services necessary and incidental to the complete fabrication, furnishing and erection of this Section as shown, noted, detailed and reasonably implied on the drawings and in the specifications.

1.3 RELATED SECTIONS

A. Coordinate work of this Section with work of other Sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other Sections, including:

1. Division 9 Section 09110 “Metal Furring and Lathing.”

1.4 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300 – Shop Drawings, Product Data and Samples.

B. Submit properly identified manufacturer's literature including material specifications for each product specified, installation recommendations and other data as may be required to show compliance with the specifications.

C. Manufacturer's certificate that materials meet specification requirements.

D. Submit quality assurance data per Article 1.6, this Section and engineering calculations per Article 1.4 E, this Section.

E. For furred and, metal stud framed wall and ceiling, or suspended ceilings (as shown or scheduled.) areas subject to wind pressure, provide the following:

1. Submit shop drawings showing complete information for fabrication and installation of furred / suspended ceiling area framing. Indicate dimensions, location, size, spacing and gauge.

2. Provide installation layout, including stucco control joints.

3. Provide location and details of anchorage devices to be embedded in other

construction.

4. Provide manufacturer's complete design calculations and shop drawings signed and sealed by a professional engineer registered in the State of Florida, indicating compliance with the Design Criteria.

1.5 DESIGN CRITERIA

A. Comply with the Florida Building Code – Latest Edition in effect, Florida Building Code – Latest Edition in effect – Test Protocols for High Velocity Hurricane Zones, NFPA 101 – Current Edition. Nothing in this Section shall be construed as allowing or requiring noncompliance with the Code.

B. Design wind pressures, uplift loads and design wind speed shall be per the Structural Drawings.

C. Wind pressures act perpendicular to flat surfaces, regardless of surface orientation. Wind pressures act perpendicular to tangents of curved surfaces. At corners and changes in plane, adjacent surfaces shall be assumed to experience the worst case combination of inward pressure simultaneously, outward pressure simultaneously, and simultaneous occurrence of inward pressure on one surface and outward pressure on adjoining surface.

D. Design units to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

E. Design component connections to accommodate building movement and thermal movement. Provide adjustment to accommodate misalignment of structure without unit distortion or damage.

1.6 QUALITY ASSURANCE

A. Unless otherwise specified comply with applicable requirements of governing codes and authorities, ASTM C926 (Stucco) and ASTM C1063 for accessories and ASTM C841 for Metal Lath and Furring.

B. This subcontractor shall have been engaged with the installation of cement plaster work, and performed this work on at least 3 projects equal in scope to this work. Submit data in writing showing compliance with these requirements to the Architect before starting of any work. See Section 00950 - Quality Assurance.

C. Allowable tolerances: maximum deviation from true plane 1/4 inch in 10 feet as measured by straight edge placed at any location on surface. Provide Architect with lightweight straight edge for checking. Architect will pierce, puncture walls for checking thickness and this subcontractor shall patch same.

D. Comply with applicable fire resistance ratings of governing codes and authorities. In fire resistant assemblies, materials, accessories and installation procedures shall have been tested and listed by Underwriters' Laboratories, ASTM E119.

1.7 SAMPLE PANEL

A. Prior to installation of exterior cement plaster work, provide portable sample mock-up panels using materials specified for final work. Build sample panels at the site, as directed, and of full thickness and approximately 3' x 3', unless otherwise shown. Demonstrate the proposed range of color, texture and workmanship to be expected in the completed work.

B. Obtain the Owner and Architect's acceptance, in writing, of visual qualities of the sample panels before start of the cement plaster work. Retain sample panels during construction as A standard for judging completed plaster work. Do not alter, move or destroy sample panels until plastering work is completed. Provide 2 sample panels for each type of exposed cement plaster.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Sections 01600 and 01620.

B. All manufactured materials shall be delivered to the project site in their original unbroken containers bearing the manufacturer's label intact and legible.

C. Store cement and lime per manufacturer's instructions.

1.9 PROJECT CONDITIONS

A. Examine metal plaster bases, backing, attachments and accessories to receive plaster and determine if the applicable requirements of ASTM C1063 have been met.

B. Hot weather requirements:

1. Protect cement plaster from uneven and excessive evaporation during hot, dry weather, in strict accordance with ASTM C926.

C. Protection:

1. Protect all finished surfaces installed prior to plastering.

2. Maintain protection in place until completion of all plaster work.

PART 2 – PRODUCTS

2.1 CEMENT PLASTER (STUCCO) MATERIALS

A. Portland Cement: In accord with ASTM C150, Type 1, Gray.

B. Masonry Cement: In accord with ASTM C91.

C. Aggregate: In accord with ASTM C897; clean, sharp washed sand free from salt and foreign material, or Lake Wales (Florida) Mineral Free Sand with written approval of stucco manufacturer.

D. Water: Clean, fresh, potable and free from minerals and organic substances that would affect the set of the stucco.

E. Lime: In accord with ASTM C206-88.

F. Conventional mix or Broco Stucco Cement manufactured by Florida Mining and Materials Corp.

G. Bonding agent shall be Lambco Primer or Acrylbond by Lambert Corp., or Bonsal Acrylic Additive by W. R. Bonsal Co.

H. Sealants and Backing Material: See Section 07900 - Caulking and Sealants.

2.2 ACCESSORIES

A. Casing Beads:

1. No. 1038, 1050, 1058, or 1078 casing bead PVC by "Vinyltech", Plastic Components, Inc., or rigid vinyl No. 6638, 6650, 6658, or 6678 by Vinyl Corp.

B. Corner Beads:

1. Nos. 1A and 2 manufactured by Plastic Components, Inc.; all vinyl, or rigid vinyl Nos. 1 and 2 by Vinyl Corp.

C. Corner Reinforcement: 3 inch "Cornerite" manufactured by Unimast.

D. Channel Reveals:

1. Channel screeds Nos. CS38-75, CS50-75, CS58-75, or CS78-75 of rigid vinyl by Vinyl Corp.

E. Control Joints:

1. Joint Nos. 2038, 2050, 2058, or 2078 PVC by "Vinyltech", Plastic Components, Inc., or rigid vinyl Nos. 1538, 1550, 1558, or 1578 with connector clips by Vinyl Corp.

F. Expansion Joints:

1. Expansion joints PVC by Vinyl Corp., Nos. 4038, 4050, 4058, or 4078, as required by paragraphs: 3.3 D. and 3.4 F.

G. Strip Reinforcing: Expanded self-furring metal lath, 6 inch wide min., weighing not less than 3.4 pounds per square yard.

H. Tie Wire: 18 gauge minimum galvanized wire. Refer also to Section 09110, Metal Furring and Lathing.

I. Fry Reglet column collar of extruded aluminum alloy 6063-T5, 0.050 inch thick with

painted finish, color as selected by Architect, or an approved equal. Spacer component shall be extruded PVC of white color.

J. Special rigid vinyl shape for intersections of channel screeds (crosses, T's, L's, etc.), with grounds and reveals dimensions to match adjacent reveals, by Vinyl Corp.

K. Soffit vent by Vinyl Corp. w/ connectors.

1. V-400: 4 inch soffit vent.

2. V-200: 2 inch soffit vent.

3. 300VF: VF clip.

4. SV58-400F.

5. SV58-200F.

L. Architectural Accents, i.e., stucco bands, etc. shall meet requirements of Florida Building Code.

M. Other manufacturers" products of Amico Alabama Metals Industries Corp. will be acceptable as a substitute for the above-listed accessory.

2.3 MATERIAL PROPORTIONS

A. Three Coat Work - Metal Lath Base:

1. Scratch Coat: 1 part Portland cement; 2 parts masonry cement; 2-1/2 to 4 parts sand, or an approved equal Factory Blend Stucco mix.

2. Brown Coat: 1 part Portland cement; 2 parts masonry cement; 3 to 5 parts sand, or an approved equal Factory Blend Stucco mix.

3. Finish Coat: 1 part Portland cement; 2 parts masonry cement; 3 parts sand, or an approved equal Factory Blend Stucco mix.

B. Two Coat Work - Concrete and Masonry:

1. Bonding agent.

2. Brown Coat: 1 part Portland cement; 2 parts masonry cement; 3 to 5 parts sand, or an approved equal Factory Blend Stucco mix.

3. Finish Coat: 1 part Portland cement; 2 parts masonry cement; 3 parts sand, or an approved equal Factory Blend Stucco mix.

C. All stucco work shall have finish coat applied uniformly to produce a texture as approved by the Architect.

D. Three Coat Work - Suspended Ceiling or Soffit – (where shown or scheduled):

1. Scratch Coat: 1 bag Portland cement, 3/4 to 1 bag lime, 5 to 6 cu. ft. sand, or an approved equal Factory Blend Stucco mix.

2. Brown Coat: 1 bag Portland cement, 1 bag lime, 6 to 7 cu. ft. sand, or an approved equal Factory Blend Stucco mix.

3. Finish Coat: 1 bag Portland cement, 2 bags lime, 7 to 10 cu. ft. sand, or an approved equal Factory Blend Stucco mix.

2.4 MIXING

A. General:

1. Prepare all plaster in a mechanical mixer, using sufficient water to produce a workable consistency and uniform color.

2. After all ingredients are in the mixer, mix the plaster for 3 to 5 minutes or until the requirements of 10.2.1 are met.

3. The amount of water used in the plaster mix should be determined by the plasterer. Factors such as the suction of the base, or of the previous coat, water content of the aggregate, drying conditions, and finishing operations should be considered in determining water usage. Use of excessive water may result in dropouts, fall or slide off, excessive shrinkage, high porosity, and lower strength.

4. Plaster mixes for either base coat that has stiffened because of evaporation of water, may be re-tempered one time by remixing with additional water to restore the required consistency. Discard plaster not used within 2-1/2 hours from start of initial mixing. Severe hot, dry climatic conditions accelerate the stiffening of plaster. Such severe conditions may require this limit to be reduced.

5. Finish-Coat plaster shall not be tempered.

B. Mechanical Mixing:

1. Clean mixer of set or hardened materials before loading for new batch.

2. Maintain mixer in continuous operation while adding materials.

3. Conform to mixing sequence, cycle of operations, and time recommended by manufacturer of plaster materials.

C. Hand Mixing:

1. Do not hand mix unless authorized by Architect/Engineer.

2.5 PAINTING

A. See Section 09900 - PAINTING for stucco paint finishes.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

A. All items in this Section shall be installed by experienced skilled mechanics in the best workmanlike manner and in this trade's best standard practice, plumb, square, level, true and in strict accordance with manufacturer's printed instructions, ASTM C926 (Stucco) and ASTM C1063 for accessories and ASTM C841 Metal Lath and Furring.

B. Examine construction, grounds, and accessories to insure that finished plaster surfaces will be true to line, level, and plumb, without requiring additional thickness of plaster.

C. All metal, or PVC, or CPVC plastic members shall be free of rust, oil or other foreign matter, which could cause bond failure or unsightly discoloration.

D. Surfaces of solid bases to receive plaster, such as masonry, stone, cast-in-place or pre-cast concrete shall be straight and true within 1/4 inch in 10 feet and shall be free of form oil or other elements, which would interfere with proper bonding. Form ties or other metal obstructions and projecting joint mortar shall be removed or trimmed back even with the surface of the solid base by others.

E. Solid surfaces shall have the suction (ability to absorb water) or surface roughness, or both, to provide the bond required for the plaster.

F. Prepare smooth or nonabsorbent solid surfaces, such as cast-in-place or pre-cast concrete, to receive Portland cement plaster by one of the following methods:

1. Pressure washing, sandblasting, wire brushing, acid etching, or chipping, or a combination of these.

2. Application of a dash-bond coat applied forcefully against the surface, left untroweled, undisturbed, and moist cured for at least 24 hours.

3. Application of a bonding compound suitable for exterior or interior exposure solid surfaces in accordance with the manufacturer's written directions.

4. Where bond cannot be obtained over the entire surface to receive plaster by one or more of the methods or where total plaster thickness will exceed the maximum thickness specified for types of solid bases, install furred or self-furring metal plaster base in accordance with ASTM. C1063.

3.2 INSTALLATION OF ACCESSORIES

A. Attach plaster accessories per manufacturer's instructions. Use not less than 18 gauge wire tie for attachment to metal lath.

B. Use single length of beads wherever length of run does not exceed longest standard stock length available. Miter or cope at corners.

C. Set beads and plaster accessories level, plumb and true to line with A tolerance of not more than 1/8 inch in 10'-0" from plumb or level. Shim as required and align joints with concealed splices or tie plates.

D. Corner beads shall be installed on all external corners and edges of corner openings. Corner beads shall extend the full height of the corners on which they are applied and shall act as a ground.

E. Cornerite shall be applied to all internal corners of surfaces to be plastered.

F. Casing beads shall be applied where stucco stops and another material begins, or where stucco abuts metal door frames, exposed concrete block walls, at all exposed terminations, and/or where indicated. Secure casing beads to metal lath with No. 16 gauge wire at 6 inches o.c. minimum. Secure casing beads to masonry with galvanized concrete stub nails at 8 inches o.c.

G. Control Joints - Expansion Joints: At exterior walls, soffits and canopies of stucco on metal lath, space one-piece control joints not exceeding 12 feet in either direction. Where there is an intersection of vertical and horizontal joints, use factory made joints. Caulk splices and intersections exposed to the elements with a sealant approved by the accessories manufacturer. In soffits and canopies, break lath and channel behind control joints.

H. Install prefabricated sheet metal items required to be "plastered-in" flush, as shown and in accordance with manufacturer's instructions. Coordinate with installation of other work so that plaster will finish plumb and flush.

I. Where dissimilar plaster bases meet, reinforce juncture with continuous strip of self-furring metal lath securely attached to each base. Use strips not less than 6 inches wide.

J. PVC casing beads, channel reveals, expansion joints and control joints - caulk ALL intersections, butt joints and ends, conforming to ASTM D1784 Cell Classification 13244C.

K. Install Fry reglet collars at all columns where stucco ceilings abut to form a neat juncture.

L. Install ceiling and soffit vent molding around entire perimeter of all suspended stucco ceilings, or as shown on the drawings.

3.3 CEMENT PLASTER (STUCCO) - GENERAL APPLICATION

A. Apply bonding agent over concrete bases in strict accordance with printed recommendations of manufacturer's instructions.

B. Proper consistency for hand-applied plaster may be determined by slump testing. Material to be tested shall be taken from the mixer of the plastering hose. The

maximum allowable slump shall be 2-1/2 inches using a 2-inches by 4-inches by 6 inches high slump cone.

C. Curing shall mean that sufficient moisture shall be retained or intermittently applied as required to the plaster surface to permit the hydration process of the cementitious materials to continue. Climatic and job conditions will determine the most effective procedure for curing and time between coats. The contractor shall be responsible for curing.

D. Stucco which is excessively cracked or crazed will not be accepted. Remove and replace unacceptable stucco including base material if damaged.

E. Plaster thickness is measured from the back plane of metal reinforcement, exclusive of ribs or dimples and from the face of solid backing or support, with or without metal reinforcement to the finished plaster surface, inclusive of moderate texture variations.

F. Do not apply Portland cement-based plaster directly to the surface of solid backing consisting of gypsum board, gypsum plaster, wood, or rigid foam board-type products without the application of metal plaster base.

G. Apply each plaster coat to an entire wall or ceiling panel without interruption to avoid cold joints and abrupt changes in the uniform appearance of succeeding coats. Wet plaster shall abut set plaster at naturally occurring interruptions in the plane of the plaster, such as corner angles, rustications, openings, and control joints where this is possible. Cut joinings, where necessary, square and straight and at least 6 inches away from a joining in the preceding coat.

H. Use three-coat work over all metal plaster base, with or without solid backing. The combined total thickness shall be as shown. A dash-bond coat shall not replace one of the specified number of coats.

I. Two-coat work may be used only over solid bases. The combined total thickness shall be as shown or specified herein. A dash-bond coat shall not replace one of the specified number of coats.

J. Apply a back plaster coat, where required, only after the coat on the opposite side has set sufficiently to resist breaking or cracking the plaster keys.

K. Permit each coat to cure before the next coat is applied.

l. Dampen plaster coats that have become dry evenly with water prior to applying subsequent coats to obtain uniform suction. There shall be no visible water on the surface when plaster is applied.

3.4 APPLICATION TO METAL LATH

A. First coat shall be applied with sufficient material and pressure to form full keys through and to embed the metal reinforcement and with sufficient depth of material over the metal reinforcement to allow for scratching (scoring) of the surface.

1. As soon as the first coat has become firm, its entire surface shall be scratched (scored) in one direction only, to provide mechanical bond with the second coat. On vertical surfaces the scratching or scoring shall be horizontal.

2. The first coat shall become sufficiently rigid to support the application of the second coat without damage to the monolithic continuity of the first coat or it's key.

B. Second coat shall be applied with sufficient material and pressure to insure tight contact with the scratch coat and to bring the combined thickness of the first and second coats to the thickness specified.

1. The surface shall be brought to a true, even plane by rodding and surface defects and scratches shall be filled with plaster.

2. Float the surface uniformly to promote densification of the coat and to provide a surface receptive to bonding of the finish coat.

C. Finish coats shall be applied by machine or hand with sufficient material and pressure to completely cover and ensure tight contact with the base coat.

D. Thickness: per ASTM C926 - 3 coats.

1. Exterior:

a. Vertical Surfaces: 3/8 inch, 3/8 inch, 1/8 inch, total of 7/8 inch.

b. Horizontal Surfaces: 1/4 inch, 1/4 inch, 1/8 inch, total of 5/8 inch.

3.5 APPLICATION TO SOLID BASES

A. Before the application of stucco to concrete or masonry, all surfaces shall be clean, free from defect, and all accessories installed. The plane tolerance shall not exceed 1/4 inch in 10 feet.

B. Concrete surfaces to receive stucco shall be coated with a bonding agent to insure proper bond.

C. Dampen high-suction bases with clean water prior to the application of plaster. Do not dampen low-suction solid bases, such as dense concrete.

D. First coat shall be applied with sufficient pressure and material to ensure tight contact with and complete coverage of the solid base to the thickness specified.

1. Score this coat immediately.

2. Score vertical surfaces horizontally.

E. Finish coat shall be applied as specified above for the first coat, except that it shall be brought to the specified finish. Where any previous plaster has become dry,

the surface shall be evenly dampened with water to obtain uniform suction. Finish coats shall be applied by machine or hand with sufficient material and pressure to completely cover and ensure tight contact with the base coat.

F. Thickness: Per ASTM C926 - 2 coats.

1. Exterior:

a. Vertical surfaces:

(1). Unit masonry: 3/8 inch, 1/8 inch, total of 1/2 inch.

(2). Cast-in-place concrete: 1/4 inch, 1/8 inch, total of 3/8 inch.

b. Horizontal surfaces:

(1). Unit masonry: 1/4 inch, 1/8 inch, total of 3/8 inch.

(2). Concrete: 1/4 inch, 1/8 inch, total of 3/8 inch.

3.6 CURING AND TIME BETWEEN COATS

A. The timing between coats will vary with climatic conditions and types of plaster base. Temperature and relative humidity extend or reduce the time between consecutive operations. Cold or wet weather lengthens and hot or dry weather shortens the time period. Moderate changes in temperature and relative humidity can be overcome by providing additional heating materials during cold weather and by reducing the absorption of the base by pre-wetting during hot or dry weather.

B. To provide more intimate contact and bond between coats and to reduce rapid water loss, as soon as the first coat is sufficiently rigid to resist cracking, the second coat should be applied.

C. The amount of water and the timing for curing Portland cement plaster will vary with the climatic conditions, the type of base, and use or non-use of water-retentive admixtures.

D. Some moisture must be retained in or added back to freshly applied plaster. If the relative humidity is relatively high (above 75 percent relative humidity), the frequency for rewetting a surface may be reduced. It is hot, dry, and windy, the frequency of rewetting must be increased.

E. The method of curing selected should consider the physical characteristics of the structure as well as the previously mentioned conditions. The methods can be one or a combination of the following:

1. Moist curing is accomplished by applying a fine fog spray of water as frequently as required, generally twice daily in the morning and evening. Care must be exercised to avoid erosion damage to plaster surfaces. Except for severe drying conditions, the wetting of finish coat should be

avoided, that is, the basecoat prior to application of the finish coat.

2. Plastic film, when taped or weighted down around the perimeter of the plastered area, can provide a vapor barrier to retain the moisture between the membrane and plaster. Care must be exercised in placing the film: if too soon, the film may damage surface texture; if too late, the moisture may have already escaped.

3. Canvas, cloth, or sheet material barriers can be erected to deflect sunlight and wind, both of which will reduce the rate of evaporation. If the humidity is very low, this option may not provide adequate protection.

3.7 PATCHING

A. All defects and damaged areas shall be cut out and replaced to match adjacent surfaces at no extra cost to the Owner.

B. Repair cracks and indented surfaces by moistening plaster and filling with new material, troweled or tamped flush with adjoining surfaces.

C. Point-up finish plaster surfaces around items that are built into or penetrate plaster surfaces.

3.8 CLEANING AND PROTECTION

A. After completion of work, remove all scaffolding, tools and other equipment from the building, taking care not to damage work of other trades. Remove all plaster from glass, trim and other finishes. All plaster and stucco rubbish shall be removed and the building left broom clean.

B. Installer shall advise Contractor of requirements for protection of plaster from deterioration and damage until time of acceptance of the work.

3.9 MATERIAL AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and be replaced with new material in the best workmanlike manner at no extra cost to the Owner and to the full satisfaction of the Architect and Owner.

END OF SECTION 09180

SECTION 09260 – GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Interior gypsum wallboard.
2. Gypsum board panels for ceilings and soffits.
3. Tile backing panels.
4. Non-load-bearing steel framing.

B. Related Requirements:

1. Division 5 Section “Structural Metal Studs” for heavy gauge metal stud framing at load bearing and exterior walls.

2. Division 7 Section “Caulking and Sealants” and “Fire Resistive Joint Systems.”

1.3 REFERENCES

A. ASTM C36 – Standard Specification for Gypsum Wallboard.

B. ASTM C79 – Standard Specification for Gypsum Sheathing Board.

C. ASTM C442 – Standard Specification for Gypsum Backing Board and Coreboard.

D. ASTM C475 – Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

E. ASTM C630 – Standard Specification for Water-Resistant Gypsum Backing Board.

F. ASTM C645 – Standard Specification for Non-Load (Axial) bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board.

G. ASTM C754 – Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Board.

H. ASTM C840 – Standard Specification for Application and Finishing of Gypsum Board.

I. ASTM C1002 – Standard Specification for Steel Drill Screws for the Application of Gypsum board or Metal Plaster Bases.

J. ASTM E90 – Standard Test Method for Laboratory measurement of Airbourne-Sound Transmission Loss of Building Partitions.

K. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.

L. GA-201 – Using Gypsum Board for Walls and Ceilings.

M. GA-214 – Recommended Specification: levels of Gypsum Board Finish.

N. GA-216 – Recommended Specification for the Application and Finishing of Gypsum Board.

O. GA-600 – Fire Resistance Design Manual.

P. UL – Fire Resistance Design Manual.

Q. WH (Warnock Hershey) – Certification Listings.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design non-load-bearing steel framing, including comprehensive engineering analysis by a qualified professional engineer licensed in the State of Florida, using performance requirements and design criteria indicated.

1.5 SUBMITTALS

A. Product Data: For each product indicated.

B. Samples: For each textured finish indicated and on same backing indicated for Work.

C. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed structural design of framing, and sealed by the qualified professional engineer, licensed in the State of Florida, responsible for their preparation.

1. Submit shop drawings showing complete information for fabrication and installation of furred / suspended ceiling area framing. Indicate dimensions, location, size, spacing and gauge.
2. Provide installation layout.
3. Provide location and details of anchorage devices to be embedded in other construction.

D. Submit a manufacturer’s certificate that materials meet specification and project requirements.

1.6 QUALITY ASSURANCE

A. Qualification Data: For qualified professional engineer.

B. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

C. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

D. This subcontractor shall have been engaged with the installation of gypsum wallboard work and performed this work on at least three (3) projects equal in scope to this work. Submit data in writing showing compliance with these requirements to the Architect before starting of any work. See Section 00950 – Quality Assurance.

E. Gypsum Board Finish – Level 5 finish at all public areas per GA-214. The surface shall be uniform light skip trowel. Any horizontal or vertical GWB area scheduled to receive wall covering or a faux finish is to receive a level 4 finish, unless noted or scheduled otherwise.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Sections 01600 and 01620.

B. Deliver all materials in their original unopened containers with manufacturer’s label intact and legible.

C. Store materials per manufacturer’s instructions.

1.8 SAMPLE PANELS

A. Provide on-site erected samples each of the following:
1. Vertical taped joints.
2. Horizontal taped joints.
3. Inside corner.
4. Outside corner.

B. Obtain Owner’s and Architect’s acceptance of visual qualities of the sample panels before start of the gypsum wallboard work. Retain sample panels during construction as a standard for judging completed wallboard work. Do not alter, move, or destroy sample panels until wallboard work is complete.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.

2. Refer to Section 01600 materials and Equipment for product substitution requirements and approvals.

2.2 INTERIOR STEEL FRAMING

A. Steel Framing, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Metal complying with ASTM C 645 requirements.

a. Protective Coating:

1) Interior Applications: ASTM A 653/A 653M, G40, hot-dip galvanized zinc coating.
2) Exterior Applications: ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating

2. Light gauge steel framing: Unimast Corp., Dietrich Industries, Inc., Dale/Incor Industries of Florida, or approved equivalent.

3. Refer to specification Section 05410 for exterior and heavy gauge structural framing.

B. Suspended Ceiling and Soffit Framing:

1. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch- diameter wire.
2. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch diameter.
3. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch, a minimum 1/2-inch- wide flange, and 1-1/2” in depth.
4. Furring Channels (Furring Members):

a. Cold Rolled Channels: 0.0538-inch bare steel thickness, with minimum 1/2-inch- wide flange, 3/4 inch deep.
b. Steel Studs: ASTM C 645, in depth indicated.

1) Minimum Base Metal Thickness: 0.0179 inch.

c. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.

1) Minimum Base Metal Thickness: 0.0179 inch.

C. Partition and Soffit Framing:

1. Steel Studs and Runners: ASTM C 645, in depth indicated.

a. Minimum Base Metal Thickness: 0.0179 inch.0312 inch.

2. Deep-Leg Deflection Track: ASTM C 645 top runner with 2-inch- deep flanges.
3. Cold-Rolled Channel Bridging: 0.0538-inch bare steel thickness, with minimum 1/2-inch- wide flange, and in depth indicated.

a. Clip Angle: 1-1/2 by 1-1/2 inch, 0.068-inch- thick, galvanized steel.

4. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum bare metal thickness of 0.0179 inch, and 2 inches deep.
5. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

2.3 PANEL PRODUCTS

A. Recycled Content of Gypsum Panel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than (75%) seventy five percent.

B. Regional Materials: Gypsum panel products shall be manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

C. Panel Size, General: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

D. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Gypsum.
2. Georgia-Pacific Gypsum LLC.
3. Lafarge North America Inc.
4. National Gypsum Company.
5. USG Corporation.
6. Certainteed.

E. Gypsum Wallboard: ASTM C 1396/C 1396M.

1. Type X: 5/8 inch and with long edges tapered.

F. Sag-Resistant Gypsum Wallboard: ASTM C 1396/C 1396M, manufactured to have more sag resistance than regular-type gypsum board, 5/8 inch thick, and with long edges tapered. Apply on ceiling surfaces.

G. Water/Moisture Resistance Gypsum Board:

1. Core: Mold and moisture resistant gypsum core.
2. Surface Paper: Mold and moisture resistant paper on front, back, and along edges.
3. Long Edges – Tapered.
4. Overall Thickness – 5/8 inches.
5. Panel to comply with requirements of ASTM C1396.
6. Mold/Mildew Resistance: Score of 10 when tested in accordance with ASTM D3273.

H. Tile Backing Panels:

1. Cementitious Backer Units: Durock Board (Cement Board) complying with ANSI A118.9.
2. Size and Thickness: 5/8 inch.
3. Corrosion resistant fasteners.
4. Joint reinforcement: 2 inch wide Imperta Glass – fiber; open weave tape, Type P
5. Accessories: manufacturer's standard.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges.
3. Expansion (Control) Joint: Use where indicated or where unbroken panel lengths exceed 30 feet.

B. Aluminum Trim: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475.

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.
2. Exterior Gypsum Soffit Board: Paper.
3. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, flanges of trim accessories, and fasteners, use drying-type, all-purpose compound.

    a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.

D. Joint Compound for Tile Backing Panels:

1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.6 METAL FRAMING

A. Studs shall be screw type, roll-formed channel studs and tracks, of sizes shown on Drawings, fabricated from 25 gauge steel unless otherwise shown or specified, with stud flanges not less than 1-1/4 inch wide, of galvanized steel. Provide 20 gauge bottom track, typical.

B. At all hollow metal doorframes, cased openings, and end of walls, provide one 20 gauge metal stud. Headers up to 4’-0” wide shall be made of same. Headers from 4’-1” to 6’-0” shall be two 3-5/8 inch 20 gauge metal studs on edge. Headers 6’-1” to 8’-0” shall be two 6 inch 20 gauge metal studs on edge.

C. Studs shall meet or exceed ASTM C645 requirements with a minimum thickness of 0.0179 inch.

D. Use 20 gauge metal furring or metal studs at all locations scheduled to receive Durcok Board as shown/scheduled. Also, frame all outside corners using 20 gauge metal studs.

E. C. R. channel stiffeners formed of 16 gauge galvanized steel shall be installed in 25 gauge stud walls above the manufacturers specified limiting heights (10’-0” of higher).

F. RC-1 resilient channels of corrosion-resistant steel, fastened to framing per manufacturer’s recommendations.

2.7 DROPPED/FURRED DOWN CEILINGS

A. Shall be Steel Stud Furring and Steel Stud framing systems made up of 6 inches, 4 inches, 3-5/8 inches, 2-1/2 inches, and 1-5/8 inch vertical and horizontal framing or hangers. Design loads per Table for Typical Limiting Spans – Steel Stud Ceiling Systems, Deflections are not to exceed L/360.

2.8 DRYWALL SOFFITS

A. Braced soffit assembly consists of galvanized steel channel runners and studs faced with gypsum board, screw attached.

B. Maximum depth of 48 inches (vertically) and widths to 72 inches (horizontally) per requirements of Maximum Width and depth Dimensions Table of USG Systems Folder SA-923.

2.9 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining, latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Available Products:

    a. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.
    b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Isolation Strip at Exterior Walls:

1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

E. Fire Stopping / Penetration Seals

1. Refer to Section 07844 Fire resistive Joint Systems for rated assemblies and additional requirements.

PART 3 - EXECUTION

3.1 METAL FRAMING INSTALLATION

A. All items in this section shall be installed by experienced skilled mechanics in the best workmanlike manner and in this trade's best standard practice in strict accordance with manufacturer's printed specifications and installation recommendations.

B. Height of Partitions: Refer to Drawings for termination height of all partitions.

C. Install metal partitions system plumb, level and true. All joints, connections, etc. shall be fastened securely with proper fasteners as recommended by manufacturer's printed instructions. Fastening surface of any framing or furring shall not vary more than 1/8 inch from plane of faces of adjacent framing, bridging or furring members.

D. Metal partitions shall be erected by aligning floor and ceiling track to ensure plumb partition. Secure track with suitable fasteners at a maximum of 24-onch o.c. provide continuous tracks sized to match studs.

E. Provide fasteners at all corners and ends of runner tracks.

F. Provide additional studs to support inside corners at partition intersections and corners and to support outside corners, terminations of partitions, both sides of control joints (if any) and adjacent to all openings. For gypsum plaster base applications, Keep studs not less than 2 inch or more than 6 inch from inside corners.

G. Use full-length studs between runner tracks wherever possible. If necessary splice studs by nesting with a minimum lap of 8 inch and fasten laps with 2 screws through each flange.

H. Friction fit studs to runner tracks by positioning and rotating into place. Provide positive attachment to runner tracks for all studs using 7/16 inch self-tapping screws or stud clinching tool on both flanges of studs.

I. Provide rough framing at openings using full-length studs adjacent to jambs and horizontal header and sill tracks. Cut horizontal tracks to length, split flanges, bend webs at end of flange overlap, and screw attachment to jamb studs. Install cut to length, intermediate studs between jamb studs at head and sill sections at same spacing as full-length studs.

J. Stiffen drywall partitions horizontally with ¾ inch cold-rolled steel channel stiffeners. Install channels horizontally through stud knockouts at 4'-0" on center vertical spacing. Wire tie to each stud or secure as recommended by stud manufacturer. The 25 gauge metal stud walls, 16 inch o.c. up to and including the manufacturers specified limiting height, are not required to have C.R. channels unless required in specific areas due to extra loading requirements and/or fire rating requirements.

K. At plumbing chase walls provide two 1/2 inch by 12 inch high by thickness of wall wallboard stiffeners as per manufacturer's printed instructions, or 6" minimum width 25 gauge metal studs.

L. For extra heavy loads, shelf brackets, TV's, wall mounted furnishings, millwork, fixture brackets, handicap accessories, etc. provide proper supports as recommended by the manufacturer's printed instructions.

3.2 NON-LOAD-BEARING STEEL FRAMING INSTALLATION

A. General: Comply with ASTM C 754, and ASTM C 840 requirements that apply to framing installation.

B. Suspended Ceiling and Soffit Framing:

1. Suspend ceiling hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
3. Attach hangers to structural members. Do not support ceilings from or attach hangers to permanent metal forms, steel deck tabs, steel roof decks, ducts, pipes, or conduit.
4. Wire-tie furring channels to supports.

C. Partition and Soffit Framing:

1. Where studs are installed directly against exterior walls, install isolation strip between studs and wall.
2. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
3. Frame door openings to comply with GA-600 and with gypsum board manufacturer's applicable written recommendations, unless otherwise indicated. Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb, unless otherwise indicated.
    b. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

4. Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

D. Z-Furring Members: Erect insulation vertically and hold in place with Z-furring members.

1. Until gypsum board is installed, hold insulation in place with 10-inch staples fabricated from 0.0625-inch- diameter, tie wire and inserted through slot in web of member.

3.3 PANEL PRODUCT INSTALLATION

A. Gypsum Board: Comply with ASTM C 840 and GA-216.

1. Space screws a maximum of 12 inches o.c. for vertical applications.
2. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c.
3. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
4. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
5. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
6. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.
7. Laminating to Substrate: Comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.
8. Meet applicable requirements of governing authorities. Install to meet fire rating, STC requirements as indicated.
9. Comply with applicable recommendations, requirements of “Specifications of Application, Finishing of Gypsum Wallboard”; GA-216 and ASTM C840.
10. All gypsum wallboard to be sound, free of cracks, breaks, broken edges and corners. Precautions will be taken to prevent delamination and exposure to sunlight or ultra-violet radiation.
11. Cut wallboard by scoring, breaking or sawing. Work from face side. Scribe wallboard to fit abutting surfaces.
12. At radius walls, dampen both sides of wallboard; allow time for penetration of moisture to core before bending. Bend to give smooth, even curve on finish side.
13. Cut openings for electrical outlets, fixtures, piping and other penetrations. Maintain close tolerances for accurate fit to allow for covering of edges with plates and escutcheons. Patch all penetrations at fire or sound walls with penetration seal – see Section 07900 for additional requirements.
14. Apply wallboard to ceilings, horizontal surfaces, before applying to vertical surfaces.
15. Stagger joints between gypsum base sheets on opposite side of partitions. Do not location vertical joints within 8 inches from corners of door frames and other openings.
16. Use maximum practical length base sheets required to minimalize end joints and stagger end joints over studs.
17. Butt joints loosely, maximum gap 1/4 inch. Sand edges that have been cut.

18. Wallboard surfaces, corners of columns, walls and partitions shall be accurately aligned, level, plumb, true to line without any deflection, bow or twist, ready to receive without adjustments subsequent interior finishes.
19. Provide fasteners of the type and size recommended by the gypsum plaster base manufacturer for the applications shown and specified. Set heads slightly below surface of base, but do not break paper face.
20. Fasten to metal studs or metal furring with self-tapping screws. Comply with manufacturer's instructions for fastening, but do not exceed 12 inch o.c. spacing for screws; except in vertical applications, space screws from edge joints not more than 9 inches o.c.
21. Joints: Apply joint compound and tape according to Gypsum Wallboard System used in strict accordance with manufacturer's written instructions.
22. Thickness: Wallboard thickness shall be as required and shown on Drawings to fulfill compliance with the total wallboard system and its intended use.

B. Tile Backing Panels (Cement Board):

1. Cementitious Backer Units: ANSI A108.11, at wet wall locations indicated to receive tile or as scheduled.

C. Moisture Resistant Gypsum Board:
1. Install Moisture Resistant Board at all wet walls whether or not scheduled or shown (adjacent to or within 8 feet of plumbing fixtures) not scheduled to receive tile. Tiles walls to receive cement board backer.

3.4 FINISHING

A. Installing Trim Accessories: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

1. Aluminum Trim: Install in locations indicated on Drawings and where recommended in writing by ceiling suspension system manufacturer for trim for suspended ceilings.

B. Finishing Gypsum Board Panels: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Finish level as specified or scheduled.

1. Prefill open joints, rounded or beveled edges, and damaged surface areas.
2. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

C. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:

1. Level 1: Embed tape at joints in ceiling plenum areas and concealed areas.
2. Level 2: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges where panels are substrate for tile.

3. Level 3: Where panels are substrate for vinyl wallcovering (VWC) as recommended by VWC manufacturer.
4. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges at panel surfaces that will be exposed to view, unless otherwise indicated.
5. Level 5: A level 4 finish with an additional level of surface treatment, such as a thin skim coat of joint compound applied to the entire surface.

D. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.5 PERIMETER CAULKING INSTALLTION

A. Caulk perimeter of indicated applications as follows:
1. At all sound insulated partitions provide continuous beads of sealant at juncture of both faces of runners or plates with floors, walls and ceiling construction and wherever gypsum wallboard abuts dissimilar materials.
2. At control joints provide continuous bead of sealant at faces of control joints. Caulk prior to installation of surface-applied control joint accessories and locate at proper depth in joint to allow for insertion of expansion portion of control joint accessory.
3. At openings and cutouts, fill open spaces between gypsum base and fixtures, cabinets, ducts and other flush or penetrating items, with continuous bead of sealant.
4. Caulk sides and backs of electrical boxes to completely seal openings and joints at sound insulated walls and fire rated walls.

3.6 SUSPENDED CEILINGS

A. The Contractor shall furnish and install the suspended ceiling system in strict accordance with ASTM C636 and the manufacturer’s printed instructions.

B. The ceiling suspension system shall be leveled to within 1/8 inch in 12 feet prior to placing drywall and the deflection of any component shall not exceed 1/360 of span.

C. The ceiling system shall be supported from the structure above the metal stud framing or No. 9 gauge hanger wire minimum. The supporting of wires from mechanical or electrical equipment, piping, ductwork or other equipment above ceiling SHALL NOT BE PERMITTED.

D. Additional supports shall be provided for light fixtures, A/C grilles, panel access doors, etc.

3.7 CUTTING AND PATCHING

A. Cut, patch, repair and point-up plaster as required and as directed by the Architect. Repair cracks and indented surfaces by moistening plaster and filling with new material, troweled or tamped flush with adjoining surfaces.

3.8 CLEANING AND PROTECTION

A. All finish materials and finish surfaces must be protected from contact with veneer – other surfaces that have been stained, marred or otherwise damaged during the plastering work.

B. When work is completed, remove unused materials, containers and equipment and clean floors of all debris and leave room broom clean. Installer shall advise Contractor of requirements for protecting the work from deterioration and damage until time of acceptance.

3.9 MATERIAL AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and be replaced with new material in the best workmanlike manner at NO EXTRA COST to the Owner.

END OF SECTION 09260

SECTION 09310 – CERAMIC TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENT

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Porcelain floor and wall tile.
2. Glazed ceramic mosaic wall tile.

B. Related Sections include the following:

1. Division 7 Section “Membrane Waterproofing” for membrane waterproofing (showers).
2. Division 15 for floor drains.
3. Division 9 Section “Gypsum Board Assemblies” for cement backerboards within drywall assemblies for all wall tile applications and ceramic wall boards porcelain panels.

1.3 SUBMITTALS

A. Product Data: For each product indicated.

B. Compatibility Certification: Provide certification of compatibility of sealer, grout and tile surfaces.

C. Maintenance and cleaning information for care tile floor and sealer.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Such products include, but are not limited to; porcelain tile, setting material, grout, sealant, noise transference products, transition strips, and expansion joint hardware.

B. Shop drawings indicating tile patterns and locations of widths of expansion, contraction, control and isolation joints in tile substrates and finished tile surfaces.

C. Submit list of all subcontractors that will be used on the specified project. Proof of Workman's Compensation insurance must be provided for each subcontracted worker

D. Samples: 2 Sets- 1 for Architect/Owner, 1 kept on site in a safe location through project completion.

1. Each type, composition, color, and finish of tile, Schluter Schiene transition strips and Rondec tile cap and grout.

2. Manufacturer's certifications and installation procedures.

1.5 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 5 (Five) percent of amount installed, but not less than one box for each type, composition, color, pattern, and size indicated. Label boxes to indicate room location and application and mfg's contact information.

1.6 REFERENCE STANDARDS

A. American National Standards Institute (ANSI) A137.1 American National Standard Specifications for Ceramic Tile.

B. American National Standards Institute (ANSI) A108.1A - A108.13 American National Standard Specifications for the Installation of Ceramic Tile.

C. American National Standards Institute (ANSI) A118.1 - A118.12 American National Standard Specifications for the Installation of Ceramic Tile.

D. American National Standards Institute (ANSI) A136.1 American National Standard Specifications for the Installation of Ceramic Tile.

1.7 QUALITY ASSURANCE

A. Tile Manufacturer: Company or Affiliate Company specializing in ceramic tile, trim units and/or thresholds. Obtain tile from a single source with resources to provide products of consistent quality in appearance and physical properties.

B. Installation System Manufacturer: Company specializing in adhesives, mortars, grouts and/or other installation materials including ISO 9001 certification unless noted otherwise by Architect.

C. Installer qualifications: company specializing in installation of ceramic tile, mosaics, with documented experience with similar installations of similar scope, materials and design; or written certification and approval of the installers qualifications from the material supplier.

1.8 MOCK-UPS

A. Provide mock-up of each type/style/finish/size/color of ceramic tile, trim unit and threshold, along with respective installation adhesives, mortars, grouts and other installation materials. Mock ups for floor tile shall be a minimum of 3 tiles wide x 3 tiles high and include both polished and unpolished versions of the tile as scheduled.

B. For patterned wall tile, layout a measured profile of the tile pattern and obtain Architect's and Owner's approval prior to placing the tile. The pattern shall be continuous at adjoining and intersecting walls.

1.9 PRE-INSTALLATION CONFERENCE

A. Pre-installation conference: At least three weeks prior to commencing the work attend a meeting at the jobsite to discuss conformance with requirements of the Drawings, Specification and job site conditions. Representatives of Owner or Owner's designated representative, Architect, General Contractor, , tile subcontractor, and any other parties who are involved in the scope of this installation must attend the meeting.

B. Layout and field verify wall tile pattern prior to placing tile and as part of pre-installation meeting.

1.10 SEQUENCING AND SCHEDULING

A. Coordinate installation of tile work with related work.

B. Proceed with tile work only after curbs, vents, drains, piping, and other projections through substrate have been installed and when substrate construction and framing of openings have been completed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles, where titles below introduce lists, the following requirements apply for product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified as the Basis of Design.

2. Product Source Reference: Mike Hubert – Garden State Tile @ 1-407-982-0430. Carolina Coelho – Tilebar @ 1-888-541-3840

2.2 TILE PRODUCTS

A. Manufacturers: The Basis-of-Design shall be:

1. As scheduled and shown on the drawings, or as selected by the Architect and the Owner. The pattern, size and material designations are shown on the drawings.
2. Tile components shall include, but are not limited to, field tile, tile borders, wall tile, wainscot tile, tile base, accent tile and other elements shown on the drawings.

B. Subject to compliance with requirements for matching the color match, texture, and tile specifications, manufacturers offering products that match the color samples and tile size scheduled, or that are approved as substitutions by the Architect and the Owner or Owner's designated representative may include the following manufacturers:

1. Garden State Tile
2. Tilebar
3. Emser Tile

C. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

D. Porcelain Floor Tile:

1. Composition: Porcelain.
2. Surface: >250, per ASTM C501, Matte and polished finishes.
3. Module Size: Reference Drawings for module size No substitutions or changes to tile sizes will be authorized.
4. Nominal Thickness: 3/8 inch nominal (MIN). unless otherwise defined Face: Factory Rectified For Flatness, Squareness and Consistent Thickness.
5. Color and Pattern: As selected by the Architect and the from manufacturer's full range and to match the tile colors and finished shown in the drawings.
6. Trim Units: Coordinated with sizes and coursing of adjoining flat

tile where applicable and matching characteristics of adjoining flat tile.

a. Provide shapes and borders as shown on the Drawings and as, selected from manufacturer's standard shapes. All corners should be mitered.

7. Tile Floor Base

a. At public restrooms, provide square edge module size same as adjoining floor tile with Schluter Rondec cap #80 trim continuous at all base tile; 1-Tile high tile base – (6 inches high), unless noted otherwise, color to match the adjoining floor tile scheduled & vertical edges or adjoining corners. Provide metal cove at the base of all tiled walls, with matching preformed corners and trim.

b. Mech. areas and Back of House (non-public areas)
Areas provide cove tile base only 4" inches high where scheduled.

c. At non-public areas the base and wainscot tile where scheduled color to match wall tile color.

d. Provide metal square edge cap at public areas, lobby & corridors at the top of tile base; metal cove trim is not required at tile base and floor tile intersection at the lobby & corridor.

2.2 ACCESSORY MATERIALS

A. Metal Trim: Schluter "Rondec" bullnose type profile with symmetrically rounded visible surface with ¼" (6mm) radius, integrated trapezoid perforated anchoring leg, and integrated grout joint spacer. Finish to be Satin Nickel Anodized aluminum. Thickness to match tile thickness. Metal trim system shall include preformed inside and outside corners and concealed connectors at splice joints where trim cannot be run continuously. Schluter (Schiene" square corner type profile for tile base cap. Schluter "cove" for restroom & locker rooms tile wall & base intersection with wall tile. Provide preformed corners & joints for all metal trim.

B. Recessed Soap Dishes: "Recess-it" Tile Backer: Aluminum – prefabricated waterproofing soap dish & floating shelf.

1. One Recess-It with optional floating shelf (Rec 1418) and one Recess-It (Rec 614) at each shower.

2.3 SETTING AND GROUTING MATERIALS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Bostick

2. C-Cure
3. Custom Building Products
4. DAP, Inc.
5. Laticrete International, Inc.
6. MAPEI Corporation
7. Southern Grouts & Mortars, Inc.
8. Summitville Tiles, Inc.
9. TEC Specialty Products, Inc.

B. Latex-Portland Cement Mortar (Thin Set Tile/Thick Set Bed): ANSI A118.4.

1. Prepackaged dry-mortar mix containing dry additive to which only water must be added.
2. Prepackaged dry-mortar mix combined with liquid-latex additive.
3. For wall applications, provide nonsagging mortar.
4. Approved by the selected manufacturer for specific applications.
   a. Available Products.
   b. Modified non-sagging dry-set cement mortar for large and heavy tile thin-set applications complying with ANSI A118.4, A118.11 and ISO 13007 C2TES1P1: MAPEI “Ultraflex LFT” or Architect approval equal.
5. Manufacturers standard cementitious setting bed at tile floors with a thick set setting bed.

C. Standard Unsanded Cement Grout: ANSI A118.6, color selected by Architect.

1. Unsanded Grout: Unsanded polymer-modified Portland cement ceramic tile grout, complying with ANSI A118.6 and ISO 13007 CG2WA, for joints less than 1/8 inch (3 mm) wide; MAPEI “Keracolor U” or Architect approved equal.

D. Polymer-Modified Tile Grout: ANSI A118.7, color as selected from manufacturers full range.

1. Polymer Type: Liquid-latex form for addition to prepackaged dray-grout mix.

2. Sanded Grout: Fast-setting sanded polymer-modified grout, complying with ANSI A118.7 and ISP 13007 CG2WAF, for joints between 1/16 inch and 1 inch (1.5 mm and 25 mm) wide; MAPEI “Ultracolor Plus” or Architect approved equal.

E. Epoxy Tile Adhesives: (Restroom floors & walls)

1. ANSI 118.3: Where indicated on the Drawings or where scheduled or specified for setting tile as specified by ANSI A108.6 Chemical Resistant, Water Cleanable tile setting and grouting epoxy over proper substrates. Kerpoxy by Mapai or Architect approved equal.

2.4 MISCELLANEOUS MATERIALS

A. Elastomeric Sealants: Elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 7 Section "Joint Sealants."

1. One-Part, Mildew-Resistant Silicone: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for in-service exposures of high humidity and extreme temperatures.

a. Available Products:

1. Dow Corning Corporation; Dow Corning 795.
2. GE Silicones; Sanitary 1700.
3. Pecora Corporation: Pecora 898 Sanitary Silicone Sealant.

a. Grout Sealer: DuPont – "Stone Tech" professional grout sealer for ceramic and porcelain tile and grout, water based, low solids coating, clear sealer **No sealer shall be applied to the face of the tile, base or wainscot; sealer shall be applied to grout only at Public areas and factory applied sealer/finish is scheduled or specified.**

PART 3 - EXECUTION

3.1 SUBSTRATE EXAMINATION

A. Verify that surfaces to be covered with ceramic tile, mosaics, pavers, brick, stone, trim or waterproofing are:
1. Sound, rigid and conform to good design/engineering practices;
2. With maximum deflection under all live, dead and impact loads, including concentrated loads, of L/360 for ceramic tile, mosaics, pavers or brick;
3. Clean and free of dust, dirt, oil, grease, sealers, curing compounds, laitance, efflorescence, form oil or loose plaster, paint and scale;
4. Level and true to within ¼" in 10', and not more than 1/16" in 1" Variation from substrate high points, for applications by the thin bed method over substrate, thin waterproof membrane or think crack isolation membrane;
5. Not leveled with gypsum or asphalt based compounds;
6. Dry as per American Society for Testing and Materials (ASTM) D4263 **"Standard Test for Determining Moisture in Concrete by the Plastic Sheet Method."**

B. Concrete surfaces shall also be:
1. Cured a minimum of 28 days at 70°F, including an initial (7) day period of wet curing;
2. Wood float finished, or better, if the installation is to be done by the thin bed method;
3. Advise General Contractor and Architect of any surface or

substrate conditions requiring correction before tile work commences

3.2 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

B. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions.

C. Remove protrusions, bumps, and ridges by sanding or grinding.

D. Blending: For tile exhibiting color variations, use factory blended tile or blend tiles at Project site before installing.

E. Feathering: Where tile meets carpet, feather the tile up to and flush with the carpet, no transition strips will be accepted between carpet and new tile. For thresholds, all threshold locations must be approved prior to installation. Anchor guards to substrate.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation" latest edition. Comply with TCA installation methods indicated in ceramic tile installation schedules.

C. Cut and fit ceramic tile, brick or stone neatly around corners, fittings, and obstructions. Perimeter pieces to be minimum half tile, brick or stone. Chipped, cracked, split pieces and edges are not acceptable. Make joints even, straight, plumb and of uniform width to tolerance +- 1/16” over 8’. Install divider strips at junction of flooring and dissimilar materials.

D. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

E. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Grind cut edges of tile abutting trim, finish, or built-in items. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

F. Jointing Pattern: Lay tile in grid patterns exactly as shown on the Interior Design Drawings Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated. Grout joints shall not exceed 1/8" in width.

G. Grout tile to comply with requirements of ANSI A108.10, unless otherwise indicated.

H. Install tile on floors with the following joint widths:
1. Porcelain Tile 1/8 inch.
2. Install floor leveling material as required to achieve floor flatness value to meet mfgs. and TCA handbook, latest edition requirements for grout joint width specified.
3. Confirm tile cutting and joint pattern with Architect at sloped floors and drains.

I. Stone Thresholds: Install stone thresholds at tile floor transitions at doorways or locations specified, indicated or scheduled; set in same type of setting bed as abutting field tile, unless otherwise indicated.

1. Set thresholds in latex-portland cement mortar for locations mortar bed would otherwise be exposed above adjacent non-tile floor finish.

J. Install tile on walls with the following joint widths: grout joints shall not exceed 1/8".

1. Porcelain Tile Trim Units: Match mfgs. joint width of field tile.

K. Metal Trim: Install metal trim profile as specified, scheduled or shown on the Drawings in accordance with the manufacture's installation requirements. Furnish and install preformed metal joints at inside and outside corners. Butt joints shall be installed with concealed internal splices. Joints shall be kept to a minimum and the trim profiles shall be installed with the longest run of material available without butt joints.

L. Setting Bed: Install cementitious setting bed at all sloped floors where scheduled or indicated. Coordinate recessed floor requirements prior to cement slab floor placement.

3.4 CLEANING

A. Clean excess mortar/epoxy from veneer surfaces with water before they harden and as work progresses. Do not contaminate open grout/caulk joints while cleaning. Sponge and wash veneers diagonally across joints. Do not

use acids for cleaning. Polish with clean dry cloth. Remove surplus materials and leave premises broom clean.

3.5 PROTECTION

A. Protect finished installation under provisions of Division 1 Section “Temporary Facilities and Controls.” Close areas to other trades and traffic until tile being installed has set firmly. Keep traffic off horizontal Portland cement thick bed mortar installations for at least 72 hours at 70°F.

B. Keep floors installed with epoxy adhesive closed to traffic for 24 hrs. at 70°F, and to heavy traffic for 48 hours @ 70°F unless instructed differently by manufacturer. Use kneeling boards, or equivalent, to walk/work on newly tiled floors. Cure tile work in restrooms for 7 days for epoxy based grout and 14 days for latex-Portland cement based grout @ 70°F before walking on the surface. Extend period of protection of tile work at lower temperatures, below 60°F and at high relative humidity (>70% R.H.) due to retarded set times of mortar/adhesives. Replace or restore work of other trades damaged or soiled by work under this section.

3.6 FLOOR TILE INSTALLATION SCHEDULE

A. Interior floor installation on concrete; thin-set mortar; TCA F113:

1. Prep walls as required for application of new tile work.
2. Thin-Set Mortar: Latex portland cement mortar.
3. Thick-Set Mortar: Where shown, or noted, or scheduled or required for floor leveling areas.
4. Grout: Polymer-modified unsanded grout, epoxy grout at the restrooms.
5. Refer to schedule and drawings for extent and location of tile.

3.7 WALL TILE INSTALLATION SCHEDULE

A. Interior wall installation; thin-set mortar; over cement board; TCA W243:

1. Thin-Set Mortar: Latex portland cement mortar.
2. Grout: Polymer-modified unsanded grout.
3. Refer to schedule and drawings for extent and location of tile.

B. GC to supply and install cement backer board for all “wet” wall tile and mosaic tile areas. Reference Specification Section 09260, Gypsum Board Assemblies for cement backer board requirements and products.

C. **PRE-FLOAT METHOD (*FOR FLOOR LEVELING AS REQUIRED)***

B. Over clean, dimensionally stable and sound concrete or masonry substrates, apply latex-Portland cement mortar as scratch/leveling coat in compliance with

current revision of ANSI A108.1 (A-1 through A-3; A-4.1a.1.4). Float surface of scratch/leveling coat plumb, true and allow mortar to set until firm. For installation of ceramic tile, mosaic, follow *Wall Tile Installation Schedule* (3.7).

3.8 MATERIAL AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and be replaced with new material in the best workmanlike manner at NO EXTRA COST to the Owner.

END OF SECTION 09310

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SECTION 09325 - NATURAL STONE GRANITE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and Division 1 Specifications, apply to this Section.

1.2 SUMMARY

A. Furnish all labor, materials, tools, equipment, etc. and services necessary and incidental to the complete fabrication, furnishing and erection of this Section as shown, noted, detailed and reasonably implied on the drawings and in the specifications.

B. Stonework includes but is not limited to the following:
   1. Reception desk countertop and lobby countertop and splashes in the reception area.
   2. Flight Crew Break Area countertop and splashes.

1.3 RELATED SECTIONS:

A. Division 6 Section “Interior Architectural Woodwork”.

B. Division 7 Section “Caulking and Sealants”.

1.4 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01330

B. Product Data: Submit manufacturer's technical data for each type of stone, stonework accessory and other manufactured product required.

C. Samples: Submit 3 samples for each color, grade, finish, type and variety of stone consisting of units not less than 12 inches by 6 inches. Include 2 or more units in each set of samples showing the full range of appearance characteristics to be expected in completed work.

D. Submit shop drawings showing locations, elevations and details, drawn to scale.

1.5 QUALITY ASSURANCE

A. Single Source Responsibility for Stone: Obtain each color, grade, finish, type and variety of stone from a single source with resources to provide materials of consistent quality in appearance and physical properties, including the capacity to cut and finish material without delaying the progress of the work.

B. Single Source Responsibility for Setting Materials: Obtain mortar ingredients of uniform quality and from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.

C. Installer Qualifications: Engage an Installer who has successfully completed interior stonework similar in material, design and extent to that indicated for this project. List in writing (5) five projects and furnish with submittals.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Section 01600.

B. Deliver materials to project in undamaged condition.

C. Store and handle stone and related materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breakage, chipping, or other causes.

D. Store cementitious materials off the ground, under cover, and in a dry location.

1.7 WARRANTY

A. Section 01740 Warranties and Bonds.

PART 2 – PRODUCTS

2.0 MATERIALS

A. Stone material: Refer to Room Finish Schedule and Drawings for locations.

B. Comply with referenced standards and other requirements indicated applicable to each type of material required.

2.1 INTERIOR MARBLE / GRANITE

A. Granite building stone standards:
1. Granite: ASTM C615, classification as selected.

B. Finish of all granite slabs and components as follows:

1. Polished - as indicated on drawings, schedules and approved samples by the Owner and Architect. Exposed countertop visible-edges to receive full bullnose; eased edge at splashes where not abutting drywall.

C. Color:

1. Basis Design: Black Granite – “Blue in the Night” by Mystic Granite or Architect and Owner approved equal.

D. Manufacturer/Supplier of granite slab: Subject to compliance with requirements, provide marble tile of following distributors (or approved equal):
   1. Mystic Granite
   2. International Granite & Marble
   3. Tile & Marble Collection Inc.
   4. Associated Imports
   5. Demarco Tile Inc.

2.2 THIN-SET PRODUCTS

A. Latex-Portland Cement Mortar: ANSI A118.4, of the following composition:
   1. Latex additive (water emulsion) of type described below, serving as a replacement for part or all of gauging water, added at job site to prepackaged dry mortar mix supplied or specified by latex manufacturer.
      a. Latex type: Manufacturer's standard

B. Manufacturers: Subject to compliance with requirements, provide products of one of the following manufacturers:
   1. American Olean Tile Co., Inc.
   2. Laticrete International Inc.
   3. W. R. Bonsal Co.

2.3 GROUTS

A. Grout colors: Provide colors to comply with the following requirements:
   1. Provide color as selected by Architect from manufacturer’s standard colors.

B. Latex-Portland Cement Grout: ANSI A118.6, of the following composition:
   1. Latex additive (water emulsion) serving as a replacement for part or all of gauging water, added at job site to prepackaged dry grout mix, with type of latex and dry grout mix complying with requirements indicated below:
      a. Latex type: Manufacturer's standard.
      b. Grout type: Commercial Portland cement grout specified or supplied by latex manufacturer.

C. Manufacturers: Subject to compliance with requirements, provide products of one of the following manufacturers:
   1. Manufacturers of Commercial Portland Cement Grouts:
      a. American Olean Tile Co., Inc.
      b. Laticrete International Inc.
      c. W. R. Bonsal Co.

   2. Manufacturers of Latex-Portland Cement Grouts:
      a. American Olean Tile Co., Inc.
      b. Laticrete International Inc.
      c. W. R. Bonsal Co.

2.4 STONE ACCESSORIES

A. Cleaner: Provide stone cleaners of proper formulation for kinds of stones, finishes and applications indicated, as recommended by stone producer and, if sealer specified, by sealer manufacturer. Do not use acid-type-cleaning agents or other cleaning compounds containing caustic or harsh fillers, except where expressly approved by stone producer for type of condition involved.

B. Sealer for granite: Colorless, stain resistant sealer which will not affect color or physical properties of stone surface, such as Ceramaseal, or as recommended by sealer and by stone producer for application indicated.

2.5 MORTAR AND GROUT MIXES

A. General: Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water repellent agents, anti-freeze compounds, or calcium chloride, unless otherwise indicated.

B. Mixing: Combine and thoroughly mix cementitious materials, water and aggregates in a mechanical batch mixer; comply with referenced ASTM or ANSI standard, as applicable, for mixing time and water content, unless otherwise indicated.

C. Setting Mortar for Wall Facing and Trim: Type N complying with ASTM C270, Proportion Specification.

2.6 FABRICATION

A. General: Fabricate interior stonework in sizes and shapes required to comply with requirement indicated, including details on drawings and final shop drawings.

B. For granite comply with recommendations of Marble Institute of America Inc. (MIA) as published in "Dimensional Stone - Design Manual III".

C. Cut stones to produce pieces of thickness, size and shape indicated or required and within fabrication tolerances recommended by applicable stone association or stone source, for faces, edges, beds, and backs.
   1. Thickness of granite counter tops: 3 cm and as indicated on drawings. All backsplashes: 4” high x 2 cm thick.

D. Dress joints (bed and vertical) straight and at 90 degree angle to face, unless otherwise indicated.
   1. Countertops to have tight joints, maximum 1/16 inch width filled with clear silicone.

E. Finish exposed faces and edges of stones to comply with requirements indicated for finish under each type and application of stone required and to match approved samples and field-constructed mock-ups.

PART 3 – EXECUTION

3.1 INSTALLATION GENERAL

A. All items in this Section shall be installed by experienced skilled mechanics in the best workmanlike manner and in this trade's best standard practice.

3.2 EXAMINATION

A. Require Installer to examine surfaces to receive stonework and conditions under which stonework will be installed and to report in writing any conditions, which are not in compliance with requirements. Do not proceed with installation until surfaces and conditions comply with requirements indicated or for execution of other work which affects stonework.

3.3 PREPARATION

A. Advise Installers of other work above specific requirements relating to placement of inserts, reglets and similar items that will be used by stonework installer for anchoring, supporting and flashing of stonework. Furnish Installers of other work with drawings or templates showing location of these items.

3.4 SETTING STONE, GENERAL

A. Execute stonework by skilled mechanics, and employ skilled stone fitters at the site to do necessary field cutting, as stones are set.
   1. Use power saws to cut stones; for exposed edges, produce edges that are cut straight and true.

B. Set stones to comply with requirements indicated on drawings and final shop drawings. Install anchors, supports, fasteners and other attachments indicated or necessary to secure stonework in place. Shim and adjust anchors, supports and accessories to set stones accurately in locations indicated with uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances.

3.5 INSTALLATION OF INTERIOR WALL SPLASH AND TRIM

A. Erect interior wall facing and trim plumb and true with joints uniform in width and accurately aligned. Provide setting buttons as required to maintain joint width.

B. Position backsplashes to maintain a 1/4 inch or less setting bed.

3.6 ADJUSTING, CLEANING AND SEALING

A. Remove and replace stonework of the following description:
   1. Broken, chipped, stained or otherwise damaged stones

2. Defective joints
3. Stonework not complying with other requirements indicated.

B. Replace in manner, which results in stonework matching approved samples, complying with other requirements, and showing no evidence of replacement.

C. Clean interior stonework after setting, pointing, grouting and curing is complete; use procedures recommended by stone producer for types of application indicated.

D. Apply sealer to cleaned interior stone countertops in compliance with sealer manufacturer's instructions.

E. Protect interior stone during construction period with Kraft paper or other heavy covering of type that will not stain or discolor stone.

F. Before inspection for substantial completion, remove protective covering and clean sealed surfaces using procedures and materials recommended by sealer manufacturer.

3.7 MATERIALS AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and be replaced with new material in the best workmanlike manner at NO EXTRA COST to the Owner.

END OF SECTION 09325

SECTION 09400- TERRAZZO FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Thin-set, epoxy-resin terrazzo flooring, custom patterned graphic and metal inserts.

B. Related Sections:

1. Division 3 Section "Cast-In-Place Concrete" for requirements for concrete slabs and to confirm coordination of terrazzo flooring edge trim installations that are to be concurrent with concrete slab construction.
2. Division 7 Section “Vapor Retarder” for vapor barriers and accessories installed under concrete slabs.

1.3 DEFINITIONS

A. Aggregate: Multiple colored Marble chips, Mother of Pearl and Glass or other types of aggregate. Multiple colors to achieve graphic effect per the Drawings

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to terrazzo including, but not limited to, the following:

a. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
b. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
c. Review special terrazzo designs and patterns and schedule of installation.

B. Conduct a pre-construction meeting and prepare a mock up with the Architect to ensure proper distribution and application of aggregate broad cast.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include terrazzo installation requirements. Include plans, elevations, sections, component details, and attachments to other work. Show layout of the following:

1. Divider strips.
2. Control-joint strips.
3. Abrasive strips.
4. Precast terrazzo jointing and edge configurations.
5. Terrazzo patterns.

C. Samples: For each exposed product and for each color and texture specified:

1. Samples for Initial Selection: NTMA color plates showing the full range of colors and patterns available for each terrazzo type; a minimum of 6 inches square in size.
2. Samples for Verification: For each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected. Label each terrazzo sample to identify manufacturer's matrix color and aggregate types, sizes, and proportions. Prepare (3) Three Samples of same thickness and from same material to be used for the Work, in size indicated below:

a. Terrazzo: 2’-0”X2’-0”- square Samples.
b. Accessories: 6-inch- long Samples of each exposed strip item required.

D. Schedule of installation with key milestone dates.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Material Certificates: For each type of terrazzo material or product, from manufacturer.

C. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.

D. LEED Submittals:

1. Product Data for Credit MR 4.1: for aggregates, indicating percentages by weight of pre-consumer recycled content.
   a. Include statement that indicates cost for each product having recycled content.
2. Product Data for Credit MR 5.1: For products manufactured within a 500 mile (804.7 km) radius of the project.
3. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content and chemical components.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For terrazzo to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications:

1. Engage an installer who is a contractor member of NTMA.
2. Engage an installer who is certified in writing by terrazzo manufacturer as qualified to install manufacturer's products.

B. Source Limitations: Obtain primary terrazzo materials from single source from single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.

C. Source Limitations for Aggregates: Obtain each color, grade, type, and variety of granular materials from single source with resources to provide materials of consistent quality in appearance and physical properties.

D. Pre-installation Conference: Conduct conference at project site to comply with requirements in Section 01310 Project management and Coordination. Prior to concrete substrate placement, review methods and procedures related to terrazzo including, but not limited to, the following:

1. Inspect and discuss installation procedures, joint details, job site conditions, substrate specifications, vapor barrier details and coordination with other trades.
2. Review and finalize construction schedule and verify availability of materials, installer’s personnel, equipment and facilities needed to make progress and avoid delays.
3. Review special terrazzo designs and patterns.
4. Review plans for concrete curing and site drying to enable timely achievement of suitable slab moisture conditions.

E. NTMA Standards: Comply with NTMA’s “Terrazzo Specifications and Design Guide” and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in supplier's original wrappings and containers, labeled with source's or manufacturer's name, material or product brand name, and lot number if any.

B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature, concrete curing period, moisture, ventilation, and other conditions affecting terrazzo installation.

B. Field Measurements: Verify actual dimensions of construction contiguous with precast terrazzo by field measurements before fabrication.

C. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation.

D. Close spaces to traffic during terrazzo application and for not less than 24 hours after application unless manufacturer recommends a longer period.

E. Control and collect water and dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.

F. Provide temporary power and water as required for operation of installation equipment.

G. Acceptable Substrates:

1. Level tolerance: Concrete subfloor shall be level with a maximum variation from level of ¼” in 10 feet (6.4 mm in 3.1m). Any irregularity of the surface requiring patching and/or leveling shall be done using Terroxy® Fill and selected aggregates as recommended by Terroxy® Resin Systems.
2. Concrete floor shall be prepared mechanically by shot blasting in accordance with ICRI Guideline No. 03732. Specifically, surface preparation results should achieve a CSP3-CSPS profile.
3. Saw cutting of control joints must be done between 12 and 24 hours after placement of the structural concrete and at a frequency compatible to ACI recommendations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NTMA Standards: Comply with NTMA's "Terrazzo Specifications and Design Guide" and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.

2.2 EPOXY-RESIN TERRAZZO

A. Epoxy-Resin Terrazzo : Comply with NTMA's "Terrazzo Specifications and Design Guide" and manufacturer's written instructions for matrix and aggregate proportions and mixing.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Key Resin Company; Key Epoxy Terrazzo or comparable product by one of the following:

    a. General Polymers Corporation; Terrazzo 1100.
    b. TEC Specialty Construction Brands, Inc.; Tuff-Lite Epoxy Terrazzo.

2. Thickness: 3/8 inch (9.5 mm) nominal.
3. Formulated Mix Color and Pattern: As selected by Architect from full range of industry colors.

B. Materials:

1. Flexible Reinforcing Membrane: Key Resin Co. KR 580 or Manufacturer's resinous membrane for substrate-crack preparation and reflective-crack reduction.
2. Primer: Key Resin Co. KR 502 or Manufacturer's product recommended for substrate and use indicated.
3. Epoxy-Resin Matrix: Key Resin Co. KR 108 or Manufacturer's standard recommended for use indicated and in color required for mix indicated.

    a. Physical Properties without Aggregates:

        1) Hardness: 60 to 85 per ASTM D 2240, Shore D.
        2) Minimum Tensile Strength: 3000 psi per ASTM D 638 for a 2-inch specimen made using a "C" die per ASTM D 412.
        3) Minimum Compressive Strength: 10,000 psi per ASTM D 695, Specimen B cylinder.
        4) Chemical Resistance: No deleterious effects by contaminants listed below after seven-day immersion at room temperature per ASTM D 1308.

            a) Distilled water.
            b) Mineral water.
            c) Isopropanol.
            d) Ethanol.
            e) 0.025 percent detergent solution.
            f) 1.0 percent soap solution.
            g) 10 percent sodium hydroxide.
            h) 10 percent hydrochloric acid.
            i) 30 percent sulfuric acid.
            j) 5 percent acetic acid.

    b. Physical Properties with Aggregates: For resin blended with Georgia white marble, ground, grouted, and cured per requirements in NTMA's "Terrazzo Specifications and Design Guide"; comply with the following:

        1) Flammability: Self-extinguishing, maximum extent of burning 1/4 inch per ASTM D 635.

2) Thermal Coefficient of Linear Expansion: 0.0025 inch/inch per deg F for temperature range of minus 12 to plus 140 deg F per ASTM D 696.

4. Aggregates: Comply with NTMA gradation standards for mix indicated and contain no deleterious or foreign matter. The aggregates shall be signed and blended to achieve the graphic image shown on the Drawings.

   a. Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C 131.
   b. 24-Hour Absorption Rate: Less than 0.75 percent.
   c. Dust Content: Less than 1.0 percent by weight.
   d. Finishing Grout: Resin based.

2.3 STRIP METAL MATERIALS

A. Thin-Set Divider Strips: L-type angle, 1/4 inch deep.

1. Material: Aluminum, 16 gauge.
2. Top Width: 1/8 inch.
3. Mitered corners.

B. Control-Joint Strips: Separate, double L-type angles, positioned back to back, that match material and color of divider strips and in depth required for topping thickness indicated.

C. Custom Cut Letters: Factory cut aluminum letters to match. Thin-set divider strips, set into resinous coating.

2.4 MISCELLANEOUS ACCESSORIES

A. Strip Adhesive: Epoxy-resin adhesive recommended by adhesive manufacturer for this use.

1. Adhesives shall have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Anchoring Devices:

1. Strips: Provide mechanical anchoring devices or adhesives for strip materials as recommended by manufacturer and required for secure attachment to substrate.
2. Precast Terrazzo: Provide mechanical anchoring devices as recommended by fabricator for proper anchorage and support of units for conditions of installation and support.

C. Patching and Fill Material: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.

D. Resinous Matrix Terrazzo Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is biodegradable, phosphate free, and recommended by sealer manufacturer for use on terrazzo type indicated.

E. Sealer: Slip- and stain-resistant, penetrating-type sealer that is chemically neutral; does not affect terrazzo color or physical properties; is recommended by sealer manufacturer; and complies with NTMA's "Terrazzo Specifications and Design Guide" for terrazzo type indicated.

1. Surface Friction: Not less than 0.6 according to ASTM D 2047.
2. Acid-Base Properties: With pH factor between 7 and 10.
3. Sealers shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions, including levelness tolerances, have been corrected.

3.2 PREPARATION

A. Clean substrates of substances, including oil, grease, and curing compounds, that might impair terrazzo bond. Provide clean, dry, and neutral substrate for terrazzo application.

B. Concrete Slabs:

1. Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with terrazzo.

a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
b. Repair damaged and deteriorated concrete according to terrazzo manufacturer's written recommendations.
c. Use patching and fill material to fill holes and depressions in substrates according to terrazzo manufacturer's written instructions.

C. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

1. Moisture Testing: Perform tests indicated below.

    a. In-Situ Probe Test: Perform relative-humidity test using in-situ probes per ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative-humidity-level measurement.
    b. Calcium Chloride Test: Perform calcium chloride test per ASTM F-1869.
    c. Proceed with installation only after substrates have been tested and, subsequently, verified that the moisture vapor emission rate does not exceed that as recommended by the manufacturer at time of installation of the flooring or any future date.
    d. If test results show excessive levels of moisture content or vapor emission rate, apply manufacturer's recommended moisture vapor emission control material based on the highest test readings, Key Resin Co. Key Epocon SL or alternate manufacturer's approved equal.

D. Protect other work from water and dust generated by grinding operations. Control water and dust to comply with environmental protection regulations.

1. Erect and maintain temporary enclosures and other suitable methods to limit water damage and dust migration and to ensure adequate ambient temperatures and ventilation conditions during installation.

E. Coordinate installation timing with the Architect to ensure an on site meeting can be conducted to allow assistance by the Architect for aggregate broadcast for custom "cloud" pattern.

3.3 EPOXY-RESIN TERRAZZO INSTALLATION

A. Comply with NTMA's written recommendations for terrazzo and accessory installation.

B. Mix place, rough grind, grout, cure grout, fine grind, and finish terrazzo according to manufacturer's written instructions and NTMA's "Terrazzo Specifications and Design Guide."

C. Installation Tolerance: Limit variation in terrazzo surface from level to 1/4 inch in 10 feet; noncumulative.

D. Random Crack Detail: For cracks over 1/16" width before surface preparations, fill saw cut with 100% solids epoxy, followed by application of Terroxy® Iso-Crack membrane (40 mils/1.0mm) with fiberglass mesh reinforcement embedded into the membrane. Note: Movement from the substrate may reflect through the finished flooring.

E. Rough Grinding: grind with 24 grit silicon carbide or 24 grit turbo diamonds until all terrazzo strips and marble chips are uniformly exposed.

F. Polishing: Polish with Resin pads or equivalent stones until all grout is removed from surface. Produce surface with a minimum of 70 percent aggregate exposure, and high polished appearance is achieved.

G. Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control-joint strips.

H. Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted.

I. Flexible Reinforcing Membrane:

1. Prepare and prefill substrate cracks with membrane material.
2. Install membrane to produce full substrate coverage in areas to receive terrazzo.
3. Prepare membrane according to manufacturer's written instructions before applying substrate primer.

J. Primer: Apply to terrazzo substrates according to manufacturer's written instructions.

K. Strip Materials:

1. Divider and Control-Joint Strips:

a. Install control-joint strips back to back directly above concrete-slab control joints.
b. Install control-joint strips with 1/4-inch gap between strips, and install sealant in gap.
c. Install strips in adhesive setting bed without voids below strips, or mechanically anchor strips as required to attach strips to substrate, as recommended by strip manufacturer.

2. Perimeter of the compass rosette elements will have an aluminum edge band, with mitered corners.
3. Perimeter of the terrazzo insert will have an aluminum edge band, with mitered corners

L. Aggregate Broadcast: Ensure that the aggregates are broad cast and applied at the density and rates as per the graphic effect per the Drawings. This will be coordinated with the Architect or designated representative on site during the application of the aggregate & background color.

3.4 REPAIR

A. Cut out and replace terrazzo areas that evidence lack of bond with substrate. Cut out terrazzo areas in panels defined by strips and replace to match adjacent terrazzo, or repair panels according to NTMA's written recommendations, as approved by Architect.

3.5 CLEANING AND PROTECTION

A. Cleaning:

1. Remove grinding dust from installation and adjacent areas.

2. Wash surfaces with cleaner according to NTMA's written recommendations and manufacturer's written instructions; rinse surfaces with water and allow them to dry thoroughly.

B. Sealing:

1. Seal surfaces according to NTMA's written recommendations.
2. Apply sealer according to sealer manufacturer's written instructions.

C. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure that terrazzo is without damage or deterioration at time of Substantial Completion.

END OF SECTION 09400

SECTION 09500 – LINEAR ACOUSTICAL METAL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Provisions and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes strip linear metal-wood grained arch'd ceiling and suspension systems for ceilings.

1. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings
2. Perimeter Trim

B. Related Sections include the following:

1. Division 5 Section 05312 Architectural (Acoustial) Ceiling Deck System for structural metal deck and finished acoustical metal ceilings.
2. Division 9 Section "Acoustical Panel Ceilings" for ceilings consisting of mineral-base and glass-fiber-base acoustical panels and exposed suspension systems.
3. Divisions 13, 15, and 16 Sections for light fixtures, sprinklers, and air-distribution components.
4. Products installed, but not furnished, under this Section include the products listed below.
    a. Suspension systems and components for ceilings, other than linear wood ceiling system manufacturer's cliprail system.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire

3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical and Lay-in Panel Ceilings
6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
7. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
8. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
9. ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint
10. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems
11. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
12. ASTM E 1264 Classification for Acoustical Ceiling Products

B. Florida Building Code

C. ASHRAE Standard 62 1 2004 Ventilation for Acceptable Indoor Air Quality

D. NFPA 70 National Electrical Code

E. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures

1.4 QUALITY ASSURANCE

A. Installer Qualifications: The installer must be a firm with a minimum of two (2) years of successful experience in installation of suspended wood ceilings of similar requirements to this project. The installer must be acceptable to Owner and Architect.

B. Fire Performance Characteristics: The wood ceiling boards shall conform to Class 1, or A flame spread rating, when tested according to ASTM E-84.

C. Environmental Standards: The wood ceiling shall originate from well managed forests as certified by accredited and recognized industry certifying organizations.

1.5 PROJECT CONDITIONS

A. Installation shall be done only when the temperature and humidity closely approximate the interior conditions that will exist when the building is occupied. The heating and cooling systems shall be operating before, during, and after installation, with the humidity of the interior spaces maintained between 25% and 55%.

B. There shall be no excessive build up of heat in the ceiling areas.

C. Prior to the start of installation, all exterior windows and doors are to be in place, glazed, and weather-stripped. The roof is to be watertight, and all wet trades' work is to be completed, and thoroughly dry.

D. Mechanical, electrical, and other utility service installations above the ceiling plane shall have been completed. No materials should rest against, or wrap around, the ceiling suspension components or connecting hangers.

1.6 COORDINATION OF WORK

A. Layout and installation of the linear ceiling and its suspension system shall be coordinated with other work penetrating through the ceiling. This includes light fixtures, HVAC equipment, and fire suppression system components.

1.7 SUBMITTALS

A. Product Data: Provide product specifications and installation instructions for all supplied ceiling materials.

B. Shop Drawings: Supply shop drawings showing the placement of hangers, the location of cliprails, and other details pertinent to proper installation.

C. Samples: A 9" wide x 12" long wood sample shall be submitted for approval. The sample shall be made of the wood specie selected, with the selected finish applied; and installed on cliprails.

1.8 DELIVERY, STORAGE, and HANDLING

A. All materials shall be delivered to the project site in the original, labeled, unopened packages.

B. Materials shall be stored flat and level in a fully enclosed space. For a minimum of seventy-two (72) hours immediately prior to ceiling installation, the linear wood strips shall be stored in the room(s) in which they will be installed. The temperature and humidity of the room(s) shall closely approximate those conditions that will exist when the building is occupied. Linear wood strips shall be stored off the floor.

C. Care in handling must be exercised to avoid damage.

1.9 WARRANTIES

A. Manufacturer: All materials supplied by the linear wood ceiling system manufacturer shall be guaranteed against manufacturing defects for one (1) year.

B. Contractor: All work shall be guaranteed for one (1) year from final acceptance of completed work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Manufacturer: Armstrong World Industries

B. Manufacturer shall furnish a suspension cliprail system with attached clips and basis-of-design wood strips necessary to complete installation, in accordance with plans and specifications. The ceiling system is arch'd as indicatd on the drawings. All components required for a finished ceiling system are to be furnished and installed.

1. Acoustical Panels -Wood Grained Finished-Micro Perforated Linear Meal Ceiling:

a. Surface Texture: Smooth

b. Composition: Metal

c. Color: Effects Cherry

d. Size: 4 in x 96 in

e. Edge Profile: Square with extended flange

f. Perforation Option: Round - Diagonal

g. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton 0.70

h. Ceiling Attenuation Class (CAC):

i. Sabin: N/A

j. Articulation Class (AC):

k. Flame Spread: ASTM E 1264; Class A (FM).

l. Light Reflectance (LR) White Panel: ASTM E 1477; 0.61.

m. Dimensional Stability: Standard

n. Recycle Content: Post-Consumer - 0% Pre-Consumer - 25%

q. Acceptable Product: METALWORKS Linear - Classics, 5492 No added formaldehyde as manufactured by Armstrong World Industries

2. Metal Panel Accessories:

1. 5494 - Contrasts Filler Strip
2. XL8945P - 4ft Drywall Cross Tee
3. 5574 Carrier molding

C. All work shall be completed in accordance with the manufacturer's instructions, and in a manner satisfactory to the Owner and Architect.

2.2 SUSPENSION SYSTEMS

A. The suspension system shall consist of manufacturer’s cliprails, installed on #12-gauge wire hangers.

2.3 EDGES, BORDERS, AND PERIMETER TRIMS

A. Edges, borders, and perimeter trims shall be manufacturer’s standard unless indicated otherwise. All wood ceiling products specified shall be supplied by the ceiling manufacturer.

2.4 FINISHES AND COLORS

A. All linear wood strips shall be factory-finished with wood stain to match architect control sample. All finishes shall be selected by the Owner and Architect.

B. Variations in grain, texture, and color – ranging from light to dark – affecting the surface look, will be determined by Owner and Architect.

PART 3 - EXECUTION

3.1 PREPARATION

A. Ceiling Layout: Measure ceiling areas and establish the layout of the hangers and cliprails, in accordance with installation instructions.

B. Coordination: Furnish the layout for supports that shall be installed for suspension of ceilings. Furnish steel deck hanger clips, or similar devices for installation, in time to coordinate the work.

3.2 INSTALLATION

A. General: Install materials in accordance with linear metal ceiling manufacturer’s international printed instructions. Comply with applicable regulations and industry standards.

B. Perimeters: Using a leveling device, lay out and install perimeter trim, as per linear wood ceiling manufacturer's recommendations.

C. Suspensions: Install suspension systems to comply with appropriate industry standards. Locate linear wood ceiling cliprails perpendicular to wood direction, 4" from one wall for the first cliprail, continuing 24" maximum, on center, ending within 4" of the opposite wall.

1. #12-Gauge Wire hangers shall be installed 4' on center, along each cliprail. The wire hangers shall be attached to inserts, screw eyes, or other connecting devices that are secure and appropriate for suspending the ceiling and that will not deteriorate or fail with age or elevated temperatures.

D. HVAC and Light Fixture Suspensions: Electrical and mechanical installations must be supported independently of the linear wood ceiling system.

E. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

F. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.

3.3 ADJUSTING AND CLEANING

A. Make final adjustments to level or contours.

B. Upon completion of ceiling installation, all Linear Metal Strips and borders shall be cleaned free of dirt, dust, grease, oils, and fingerprints.

C. All work that cannot be successfully cleaned or repaired, shall be removed and replaced.

D. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.4 INSPECTION

A. Upon completion of ceiling installation, the Owner and Architect shall inspect all finished surfaces to ensure that the work has been completed in a manner satisfactory to the Owner. Any deficiencies in the installed ceiling system shall be corrected at no additional cost to the Owner.

END OF SECTION 09570

SECTION 09511 – ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes acoustical panels and exposed suspension systems for ceilings.

B. Related Sections:

1. Division 7 Section “Building Insulation” for sound batt insulation.
2. Division 7 Section “Joint Sealants” for sealants.
3. Division 9 Section “Linear Metal Ceilings” for strip linear metal ceilings, and suspension systems for ceilings.

1.3 DEFINITIONS

A. AC: Articulation Class.

B. CAC: Ceiling Attenuation Class.

C. LR: Light Reflectance coefficient.

D. NRC: Noise Reduction Coefficient.

1.4 SUBMITIALS

A. Product Data: For each type of product indicated.

B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Ceiling suspension system members.
2. Method of attaching hangers to building structure.
3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, smoke detectors, Unistrut, Owner Furnished Equipment, sprinklers, access panels, special moldings, and starting point for ceiling layout & grid spacing.
4. Note extent of acoustical clg’s on plan layout.
5. Minimum Drawing Scale: 1/8 inch = 1 foot.

C. Qualification Data: For testing agency.

D. Field quality-control test reports.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.

F. Maintenance Data: For finishes to include in maintenance manuals.

G. MFG's Certifications: Confirmation that light fixtures specified will fit into grid without special clips or hardware.

1.5 QUALITY ASSURANCE

A. Source Limitations:

1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
2. Suspension System: Obtain each type through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:

1. Fire-Resistance Characteristics: Where indicated, provide acoustical panel ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

a. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
b. Identify materials with appropriate markings of applicable testing and inspecting agency.

2. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:

a. Smoke-Developed Index: 450 or less.
b. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.8 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including but not limited to light fixtures, HVAC equipment, fire-suppression system, speakers, smoke detectors, Unistrut, Owner Furnished Equipment and partition assemblies.

1.9 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Deliver to location designated by Owner; obtain signed receipt.
2. Acoustical Ceiling Panels: Full-size panels equal to 3 percent of quantity installed for each acoustical tile utilized (2 boxes minimum labeled by space).
3. Suspension System Components: Quantity of each exposed component equal to 3 percent of quantity installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL PANELS, GENERAL

A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E 795.

B. Acoustical Panel Colors and Patterns: As indicated in Finish Listing.

C. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.3 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING:

A. ACT-1-Basis-of-Design Product (where moisture resistant tile is scheduled): Subject to compliance with requirements, provide the following:

1. Armstrong World Industries, Inc.; "Ceramaguard 605," Square Edge, 2’ X 2’ x

5/8” Prelude XL 15/16” exposed Tee Grid.

B. Color: White.

C. Light Reflectance (LR): Not less than 0.88.

D. Ceiling Attenuation Class (CAC): Not less than 40.

E. Edge/Joint Detail: Square.

F. Antimicrobial Treatment: Humiguard Max.

G. ACT-2-Basis-of-Design Product: Subject to compliance with requirements, provide the following:

2. Armstrong World Industries, Inc.; "Cirrus," High NRC- medium texture, Angled Tegular Edge, 2’ X 2’ x 3/4” except where noted Prelude XL 15/16” exposed Tee Grid.

H. Color: White.

I. Light Reflectance (LR): Not less than 0.85.

J. Noise Reduction Coefficient (NRC): Not less than 0.55.

K. Ceiling Attenuation Class (CAC): Not less than 35.

L. Edge/Joint Detail: Angled Tegular.

M. Antimicrobial Treatment: Broad spectrum fungicide and bactericide based.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

A. Basis-of-Design Product: Subject to compliance with requirements, provide the following:

B. Armstrong World Industries, Inc.; “Prelude XL,” 15/16,” High Recycled Content (HRC), Exposed Tee. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated or required.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635,

Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft tem per.
2. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.1 06-inch diameter wire.

E. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

F. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees. Provide clips where required @ light fixtures to ensure fit & securement within grid.

2.7 ACOUSTICAL SEALANT

A. Products: Subject to compliance with requirements, provide one of the following:

1. Acoustical Sealant for Exposed and Concealed Joints:

a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
b. USG Corporation; SHEETROCK Acoustical Sealant.

B. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

2. Do not proceed with installation until all wet work such as concrete, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans & Architect approved shop drawings. Coordinate panel layout with mechanical and electrical fixtures.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C 636, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, counter-splaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
9. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or post installed anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately, with no visible gaps, into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
2. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
3. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated.

3.5 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09511

SECTION 09651 – RESILIENT FLOOR TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes Composite resilient flooring tile - VCT.

B. Related Sections include the following:

1. Section 09653 “Rubber Wall Bases and Accessories”.
2. Section 09656 “Static Dissipative Resilient Flooring”.

1.3 SUBMITTALS

A. In addition to product data, submit the following.

1. Maintenance data for products specified in this Section, to include in Operating and Maintenance Manual specified in Division 01.
2. Extra Materials: Deliver to Owner not less than one box for each 50 boxes or fraction thereof, of each class, wearing surface, color, pattern, and size of resilient floor tile installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products of the following:

1. Vinyl Composition Tile (VCT)

a. Armstrong World Industries, Inc.
b. Azrock Commercial Flooring, DOMCO
c. Mannington Mills, Inc.
d. Tarkett Inc.

2.2 VINYL COMPOSITION FLOOR TILE

A. Products complying with ASTM F 1066, Composition 1 (nonasbestos formulated), and with requirements specified below:

1. Vinyl Composition Floor Tile Product Data:

a. Class: 2
b. Thickness: 1/8"
c. Size: 12" x 12"
d. Surface: Smooth
e. Color(s): As selected by Architect from manufacturer’s full range.

2.3 CONCRETE SLAB PRIMER

A. Nonstaining type recommended by flooring manufacturer.

2.4 TROWELABLE UNDERLAYMENTS AND PATCHING COMPOUNDS

A. Latex-modified, portland-cement-based formulation provided or approved by tile manufacturer for applications indicated.

2.5 ADHESIVES (CEMENTS)

A. Water-resistant type recommended by tile manufacturer to suit resilient floor tile products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine areas where installation of tiles will occur, with Installer present, to verify that substrates and conditions are satisfactory for tile installation and comply with tile manufacturer's requirements.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 before beginning installation:

C. Comply with manufacturer's installation specifications to prepare substrates indicated to receive tile.

3.2 INSTALLATION

A. Comply with tile manufacturer's installation directions and other requirements indicated.

B. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tile widths at opposite edges of room are equal to one another and are not less than one-half of a tile.

C. Match tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged.

1. Lay tiles with grain running in one direction.

D. Where demountable partitions and other items are indicated for installing on top of finished tile floor, install tile before these items are installed.

3.3 CLEANING

A. Clean resilient tile floors after installation and 4 days prior to date scheduled for inspections intended to establish date of Substantial Completion. Apply protective polish according to floor tile manufacturer's directions.

END OF SECTION 09651

SECTION 09653 - RUBBER WALL BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Resilient base.
2. Resilient molding accessories.

1.3 RELATED SECTIONS

A. Coordinate work of this Section with work of other Sections that are required to properly execute the work and as necessary to maintain satisfactory progress of work of other Sections, including:

1. Section 09650 Rubber Flooring Tile Specification.
2. Section 09651 Resilient Floor Tile – VCT
3. Section 09680 Carpet for metal transition strips at floor material changes.
4. Section 09656 Static Dissipative Resilient Flooring for anti-static flooring

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of product indicated.

C. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.6 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. Mockups: Provide resilient products with mockups specified in other Sections.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.8 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F , in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F .

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. Resilient Base:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following :

a. Johnsonite
b. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
c. Flexco, Inc.
d. Roppe Corporation, USA.

B. Resilient Base Standard: ASTM F 1861.

1. Material Requirement: Type TS (rubber, vulcanized thermoset).
2. Manufacturing Method: Group I (solid, homogeneous).
3. Style: Cove (base with toe) .

C. Minimum Thickness: 0.125 inch.

D. Height: Four inches w/cove base at non-public or back of house areas (Offices, data room, mechanical rooms, storage rooms, etc.) as shown on the Drawings or as scheduled.

1. At public areas of the building (lobbies, hallways, corridors and alcoves adjacent to the public areas, the base shall be Roppe 700 Series or Architect and Owner approved equivalent.

2. Straight edge at carpeted areas and coved bas at non-carpeted and tiled areas or where scheduled or noted on the drawings.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Preformed.

G. Inside Corners: Job formed or preformed.

H. Finish: Matte.

I. Colors and Patterns: As selected by Architect and Owner (or Owner’s designated representative) from Manufacturer’s full range of industry colors.

2.2 RESILIENT MOLDING ACCESSORY

A. Resilient Molding Accessory:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Johnsonite
b. Burke Mercer Flooring Products: Division of Burke Industries, Inc.
c. Flexco, Inc.
d. Roppe Corporation, USA

B. Description: Nosing for resilient floor covering, Reducer strip for resilient floor covering, and Transition strips at all VCT and concrete floor transitions and openings. Refer to Section 09680 “Carpet” for transition strip requirements for carpet termination at flooring material transitions including tiled and non-tiled surfaces.

C. Material: Rubber.

D. Profile and Dimensions: As indicated or specified Owner (or Owner’s designated representative).

E. Colors and Patterns: As selected by Architect and from full range of industry colors.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), except that adhesive for rubber stair treads shall have a VOC content of 60 g/L or less.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates for Resilient Accessories: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.

a. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until they are same temperature as the space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:

1. Inside Corners: Use straight pieces of maximum lengths possible, minimum 1’-0” length.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips where specified or indicated at edges of concrete and resilient floor covering that would otherwise be exposed at flooring transitions and openings.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products until Substantial Completion.

END OF SECTION 09653

SECTION 09656 – STATIC DISSIPATIVE RESILIENT FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Static Dissipative Resilient Flooring for all IT and Data Rooms.

1.3 RELATED SECTIONS

A. Other Division 9 sections for floor finishes related to this section but not the work of this section.

B. Division 3 Concrete; not the work of this section.

C. Division 6 Wood and Plastics; not the work of this section.

D. Division 7 Thermal and Moisture Protection; not the work of this section.

1.4 REFERENCES

A. ASTM International:

1. ASTM E 648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
2. ASTM E 662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
3. ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
4. ASTM F 1066 Standard Specification for Vinyl Composition Tile.
5. ASTM F 1482, Standard Guide to Wood Underlayment Products Available for Use
Under Resilient Flooring.
6. ASTM F 1861 Standard Specification for Resilient Wall Base.
7. ASTM F 1869 Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

8. ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

B. National Fire Protection Association (NFPA):

1. NFPA 253 Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
2. NFPA 258 Standard Test Method for Measuring the Smoke Generated by Solid Materials.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of product indicated.

C. Samples for Verification: For each type of product indicated, in manufacturer's standard-size samples of each resilient product color, texture, and pattern required.

D. Product Schedule: For resilient products: Use same designations indicated on Drawings.

E. Closeout – Closeout Submittals: Submit the following:
1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and precautions against cleaning materials and methods detrimental to finishes and performances.
2. Warranty: Warranty documents specified herein.

1.4 QUALITY ASSURANCE

A. Performance Requirements:
Provide flooring which has been manufactured, fabricated and installed to performance criteria certified by manufacturer without defects, damage, or failure.

B. Administrative Requirements
1. Pre-installation Meeting: Conduct an on-site pre-installation meeting to verify project requirements, substrate conditions, manufacturer’s installation instructions and manufacturer’s warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings) Section
2. Pre-installation Testing: Conduct pre-installation testing as follows: [Specify Testing (i.e. moisture tests, bond test, pH test, etc.)].

C. Responsibility
Single-Source Responsibility: provide types of flooring and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives.

D. Select Installer
Select an installer who is competent in the installation of Armstrong resilient vinyl composition tile flooring.

1. Engage installers certified as Armstrong Commercial Certified Installers.
2. Confirm installer's certification by requesting their credentials.

E. Fire Performance
Fire Performance Characteristics: Provide resilient vinyl composition tile flooring with the following fire performance characteristics as determined by testing material in accordance with ASTM test methods indicated below by a certified testing laboratory or other testing agency acceptable to authorities having jurisdiction:

1. ASTM E 648 Critical Radiant Flux of 0.45 watts per sq. cm. or greater, Class I
2. ASTM E 662 (Smoke Generation) Maximum Specific Optical Density of 450 or l

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery:
Delivery materials in good condition to the jobsite in the manufacturer’s original unopened containers that bear the name of the manufacturer, project identification, and shipping and handling instructions.

B. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures adhesives maintained within range recommended by the manufacturer, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

1.6 PROJECT CONDITIONS

A. Install resilient products after other finishing operations, including painting, have been completed.

B. Maintain ambient temperatures within range recommended by the manufacturer, but not less than 65 deg F (18 deg C) or more than 85 deg F (29 deg C) in spaces to receive resilient products during the following time periods:
1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

C. Maintain the ambient relative humidity between 40% and 60% during installation.

D. Until Substantial Completion, maintain ambient temperatures within range recommended by the manufacturer, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

E. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances. Refer to the manufacturer’s installation manual, on project conditions and requirements.

1.8 WARRANTY

A. Resilient Flooring: Submit a written warranty executed by the manufacturer, agreeing to repair or replace resilient flooring that fails within the warranty period.

B. Warranty Period: 5 years

C. Rights:
The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

D. Validation:
For the Warranty to be valid, this product is required to be installed using the appropriate Armstrong Guaranteed Installation System. Product installed not using the specific instructions from the Guaranteed Installation System will void the warranty.

1.9 MAINTENANCE

A. Extra Materials:
Deliver extra materials to Owner. Furnish extra materials from same production run as products installed. Packaged with protective covering for storage and identified with appropriate labels.
1. Quantity: Furnish quality of flooring units not less than one box for each 50 boxes or fraction thereof of amount installed.
2. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra material.

PART 2 – PRODUCTS

2.1 MANUFACTURERS/PRODUCT DESCRIPTION:

A. Conductive Resilient Flooring: Basis of Design Manufacturer:
Armstrong Flooring Phone: (888) 276-7876
2500 Columbia Avenue
Lancaster, PA 17604
Web: www.armstrongflooring.com

Alternate manufacturers shall products approved by the Architect.

B. Static Dissipative Resilient Tile Flooring: Basis of Design
Static-Dissipative Resilient Tile Flooring with the following physical characteristics:

1. Complies with requirements for ASTM F 1700 Standard Specification for Solid Vinyl Tile.
2. Backing coated with pure carbon for increased and consistent conductivity.
3. Tile size: 24" X 24" (61 X 61 cm).
4. Wear layer/Overall thickness: .080" (2.0 mm).
5. ASTM D 2047, Standard Test Method for Static Coefficient of Friction of Polish- Coated Flooring of 0.5 or greater.
6. ASTM F 970, Standard Test Method for Static Load Limit – 250 PSI.
7. ASTM E 648, Standard Test method for Critical Radiant Flux of 0.45 watts/cm^2 or greater, Class I.
8. ANSI/ESD S7.1: 7.5×10^8, 12% RH, tested surface to ground
9. Meet OSHA/NFPA (> 2.5×10^4 ohms): 6.2×10^7 ohms.
10. Meet ASTM F 150, 10^6 to 10^9 ohms (50% RH, 100v): 6.2×10^7 ohms
11. ESD-approval (IEC 61340 / 100v): 10^7.
12. Manufacturer offers a RESTART reclamation program for returning jobsite scrap.
13. Contains 25% pre consumer recycled content.
14. Phthalate-free *(except for recycled materials).*
15. 100% Recyclable.
16. Color to be selected by Architect from manufacturer's full range of colors.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic-cement-based formulation.

B. Adhesives: As recommended by manufacturer to meet site conditions.

1. Conductive adhesive.
2. Copper grounding strips.

2.3 ACCESSORIES

A. Patching:
For patching, smoothing, and leveling monolithic subfloors (concrete, terrazzo, quarry tile, ceramic tile, and certain metals), provide Manufacturer's approval Fast-Setting Cement-Based Patch and Underlayment.

B. Sealing:
For sealing joints between the top of wall base or integral cove cap and irregular wall surfaces such as masonry, provide plastic filler applied according to the manufacturer's recommendations.

C. Transition:
Provide transition/reducing strips tapered to meet abutting materials.

D. Resilient Edge Strips:
Provide resilient edge strips of width shown on the drawings, of equal gauge to the flooring, homogeneous vinyl or rubber composition, tapered or bullnose edge, with color to match or contrast with the flooring, or as selected by the Architect from standard colors available.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the work. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer written instruction to adhesion of Conductive Resilient Flooring.
1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate paint, coatings and other substances that are incompatible with adhesives or contain soap, wax, oil, solvents, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Mechanically remove contamination on the substrate that may cause damage to the Conductive Resilient Flooring material. Permanent and non-permanent markers, pens, crayons, paint, etc., must not be used to write on the back of the flooring material or used to mark the substrate as they could bleed through and stain the flooring material.
4. Prepare Substrates according to ASTM F 710 including the following:

a. Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
1) Perform anhydrous calcium chloride test, ASTM F 1869. Results must not exceed 5 lbs. Moisture Vapor Emission Rate per 1,000 sq. ft. in 24 hours.

–
or
–

2) Perform relative humidity test using in situ probes, ASTM F 2170. Must not exceed 80%.

b. A pH test for alkalinity must be conducted. Results should range between 7 and 9. If the test results are not within the acceptable range of 7 to 9, the installation must not proceed until the problem has been corrected.
c. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.

B. Fill cracks, holes, depressions and irregularities in the substrate with good quality Portland cement based underlayment leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

C. Floor covering shall not be installed over expansion joints.

D. Do not install resilient products until they are same temperature as the space where they are to be installed.
1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOORING INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient sheet flooring.

B. Conductive Resilient Flooring:

1. Install with manufacturer’s approved adhesive as recommended in manufacturer Installation:
a. Instructions and specified for the site conditions and follow adhesive label for proper use.
2. Install with manufacturer’s approved copper grounding strips per the manufacturer’s installation instructions.
3. Roll the flooring in both directions using a 100 pound three-section roller.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

1. No traffic for 24 hours after installation.
2. No heavy traffic, rolling loads, or furniture placement for 72 hours after installation.

D. Wait 72 hours after installation before performing initial cleaning.

E. A regular maintenance program must be started after the initial cleaning.

END OF SECTION 09656

SECTION 09672 – RESINOUS FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes chemical moisture resistant aliphatic urethane epoxy flooring for the following applications:

1. Hangar floor.

1.3 RELATED SECTIONS

A. Division 3 Sections “Cast-in-Place Concrete and Concrete Curing”

1.4 REFERENCES

A. ASTM C579, Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

B. ASTM D2240, Standard Test Method for Rubber Property—Durometer Hardness.

C. ASTM D2369, Standard Test Method for Volatile Content of Coatings.

D. ASTM D4060, Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.

E. ASTM D4541, Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.

F. For additional standards please refer to Product Data Sheets

1.5 SUBMITTALS

A. Product Data: For each product indicated, including physical properties and colors available.

B. Shop Drawings: Show extent of each floor coating. Include details for treating substrate joints and cracks, and other termination conditions. Include layout of traffic striping and markings.

C. Samples: For each type of coating required, prepared on rigid backing. Provide stepped samples on backing large enough to illustrate build-up of coatings.

D. Material certificates and Installer certifications. Provide list of 5 completed projects of similar size and complexity utilizing coating system.

E. Maintenance data and instructions, including procedures for stain removal, surface repair and cleaning.

F. Compatibility Statement / Certification: Manufacturer's compatibility statement that epoxy flooring bonding surfaces and materials are acceptable surfaces for the proposed flooring coating and surfaces preparation requirements, including priming, moisture content and cleaning surfaces preparation criteria.

1.6 QUALITY CONTROL

A. Installer (Applicator) Qualifications: Applicator who is certified by manufacturer.

1. Pre-Qualification: Each bidder for this project shall be pre-qualified and approved in writing by the material manufacturer.

2. Experience: Minimum 5 years' experience on projects of similar size and complexity. Contractor shall submit a list of five projects of similar size, scope and complexity.

B. Source Limitations: Use traffic coatings of a single manufacturer.

C. Mock-Up:

1. Construct one 100 sq.ft. (10 sq.m.) mock-up of each type and color of resinous flooring in location acceptable to Architect/Engineer to demonstrate quality of finished system, complying with manufacturer's instructions.

2. Arrange for Architect/Engineer's review and acceptance, obtain written acceptance before proceeding with Work.

3. Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section. Mock-up shall be left in place for the duration of the work.

D. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 prior to installation of the concrete slab.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site in manufacturer's original and unopened containers and packaging, with labels clearly identifying product name, batch or lot number, and date of manufacture.
   1. Material should be delivered to job site and checked for completeness and shipping damage prior to job start.

B. Storage:
   1. Store materials in accordance with manufacturer's written instructions.
   2. Keep containers sealed until ready for use. Material should be stored in a dry, enclosed, protected area from the elements.
   3. Do not subject material to excessive heat or freezing.
   4. Shelf life: Established based on manufacturer's written recommendation for each material being used.

C. Condition materials for use according to manufacturer's instructions for 24 hours (minimum) prior to application.

D. Handling: Protect materials during handling and application to prevent damage or contamination.

E. Record material lot number and quantity delivered to jobsite/storage.

1.8 PROJECT CONDITIONS

A. Do not install the Work of this Section outside of the following environmental ranges without Manufacturers' written acceptance:
   1. Material Temperature: Precondition material for at least 24 hours between 65° to 75°F (18° to 24°C)
   2. Ambient Temperature: Minimum/Maximum 50˚/85˚F (10˚/30˚C)
   3. Substrate Temperature: Minimum/Maximum 50˚/85˚F (10˚/30˚C). Substrate temperature must be at least 5˚F (3˚C) above measured Dew Point.
   4. Mixing and Application attempted at Material, Ambient and/or Substrate Temperature conditions less than 65˚F (18˚C) will result in a decrease in product workability and slower cure rates.
   5. Relative Ambient Humidity: Minimum ambient humidity 30%, maximum ambient humidity 75% (during application and curing)
   6. Measure and confirm Substrate Moisture Content, Ambient Relative Humidity, Ambient and Surface Temperature and Dew Point.

B. Substrate moisture:
   1. Moisture content of concrete substrate must be ≤ 4% by mass as measured with a Tramex® CME/CMExpert type concrete moisture meter.
   2. Additionally, relative humidity tests may be conducted per ASTM F2170 and values must be ≤ 85%.
   3. If moisture content of concrete substrate is > 4% by mass as measured with Tramex® CME/CMExpert type and/or if relative humidity tests per ASTM F2170

exceed values > 85%, consider moisture mitigation systems or moisture tolerant primer.

C. Maintain constant ambient room temperature of plus or minus 15ºF (plus or minus 7ºC) with a minimum temperature of 50ºF (10ºC) and maximum temperature of 85ºF (30ºC). Maintain constant ambient room temperature for 48 hours before, during and after installation, or until cured. Do not apply while ambient and temperatures are rising.

D. Erect suitable barriers and post legible signs at points of entry to prevent traffic and trades from entering the work area during application and cure period of the floor.

E. Ensure adequate ventilation and air flow.

1.9 WARRANTY

A. Manufacturer’s warranty covering the resinous flooring against defects in materials for one year from date of installation.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace epoxy floor coating that fails in materials and workmanship within five years from date of Substantial Completion.

1. Warranty does not include deterioration or failure due to unusual weather phenomena, failure of prepared and treated substrate, formation of new substrate cracks exceeding 1/16 inch in width, fire, vandalism, or abuse by maintenance equipment, and truck traffic.
2. Failure includes, but is not limited to, the following:

a. Adhesive or cohesive failures.
b. Abrasion or tearing failures.
c. Surface crazing or spalling.
d. Intrusion of water, oils, gasoline, grease, salt, or acids into substrate.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Material Compatibility: Provide primers; base, intermediate, and top coats; and miscellaneous materials that are compatible with one another and with substrate under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
1. All materials must come from single manufacturer.

B. VOC Content: Provide materials that comply with VOC content limits established by ASTM D2369-07.

2.2 EPOXY FLOOR COATING

A. Basis-of-Design Product: The design for the hangar floor coating is based on the products indicated below, installed for a complete system. Products by other listed manufacturers may be considered provided deviations from specifications of the product named are minor as judged by the Architect.
   1. Primer: Sikafloor 161 is a two part, epoxy resin for priming and leveling mortars with the following properties:
      a. Pull-off Strength (ASTM D4541): > 400 psi (2.7 MPa) with 100% concrete failure.
      b. Shore D Hardness (ASTM D2240): 76 at 7 days.
      c. Solid Content: ~ 100% (by volume) / ~ 100% (by weight).
      d. VOC Content (ASTM D2369): ≤ 50 g/L.
      e. Permeability (ASTM E96): 9.0 g/m² (24 hours / +75°F).
      f. Water Absorption (ASTM D570): 0.14 g/h - m2.
      g. Viscosity (approximately) of Components A + B: 775 (SP2/100).
   2. Body Coat and Top Coat: Sikafloor 264 is a pigmented two part, low viscosity, self-priming, epoxy coating binder in [*Refer to Sikafloor color chart*] color with the following properties:
      a. Pull-off Strength (ASTM D4541): > 400 psi (2.7 MPa) with 100% concrete failure.
      b. Shore D Hardness (ASTM D2240): 76 at 7 days.
      c. Solid Content: ~ 100% (by volume) / ~ 100% (by weight).
      d. VOC Content (ASTM D2369): ≤ 50 g/L.
      e. Compressive Strength (ASTM C579): 7,250 psi (50 N/mm²) at 28 days.
      f. Flexural Strength (ASTM C580): 2,900 psi (20 N/mm²) at 28 days.
   3. Slurry Aggregate: Sikadur-504.
   4. Broadcast Aggregate: Sikadur-508.
      a. Furnish and evenly distribute as required to achieve a slip-resistant finish.

B. Top Coat: Sikafloor 316N is a high solids, low VOC abrasion resistant, aliphatic polyurethane coating of Architect-selected color from full range of manufacture's colors, with the following properties:

   1. Pull-off Strength to Primed Concrete (ASTM D4541): > 400 psi (2.76 MPa) with 100% concrete failure.

   2. Hardness (ASTM D 3363 Pencil): 2H to 3H concrete failure.

   3. VOC Content (ASTM D2369): With Wear Aggregate ≤ 89 g/L

   4. Tensile Strength (ASTM D638): 4,641

   5. Elongation: 85%

   6. Abrasion Resistance (ASTM D4060): 18 mg (CS-17 Wheel, 1000 gm load, 1000 cycles).

   7. Coefficient of Friction ANSI 326.3 = .56

C. Aggregate: Uniformly graded washed silica sand of particle sizes, shape, and minimum hardness recommended in writing by coating manufacturer.

1. Spreading Rate: As recommended by manufacturer for substrate and service conditions indicated, but not less than the following:

a. Top Coat: As required to achieve slip-resistant finish.

2.3 MISCELLANEOUS MATERIALS

A. Joint Sealants: Multicomponent urethane sealant recommended in writing by manufacturer for substrate and joint conditions indicated and for compatibility with epoxy floor coatings; complying with ASTM C 920.

PART 3 - EXECUTION

3.1 EXAMINATION

A. General: Comply with manufacturer's written recommendations.

B. Verify compatibility with and suitability of substrates and that substrates are visibly dry and free of moisture.

1. Application of coating indicates acceptance of surfaces and conditions.

C. Concrete Substrates: Begin coating application only after minimum concrete curing and drying period recommended by epoxy floor coating manufacturer has passed and after surfaces are dry.

1. Test for moisture by method recommended in writing by manufacturer at multiple locations within area to be coated.
2. Apply temporary moisture barrier if test results exceed acceptable application requirements.

D. Mechanical abrasion produces a uniform substrate that is generally in acceptable condition to receive coatings. See "ASTM C 1127 Requirements" Article in the Evaluations.

E. Examine surfaces to receive flooring system. Notify Architect, General Contractor and Owner if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected. Do not apply to substrate treatments for moisture, repair, or leveling not of the same Manufacturer.

F. Surface must be clean, sound and dry. Remove dust, laitance, grease, curing compounds bond inhibiting impregnations, waxes and any other contaminants. All projections, rough spots, etc. should be dressed off to achieve a level surface prior to the application.

G. Concrete substrate to have a minimum compressive strength of 3,500 psi (24 MPa) at 28 days and a minimum of 215 psi (1.5 MPa) in tension at time of application.

H. Substrate moisture:

1. Measure and confirm Substrate Moisture Content, Ambient Relative Humidity, Ambient and Surface Temperature and Dew Point.

2. Confirm and record above values at least once every 3 hours during installation, or more frequently whenever conditions change (e.g. Ambient Temperature rise/fall, Relative Humidity increase/decrease, etc.).

I. Ensure concrete substrate conforms to the minimum requirements of the flooring manufacturer.

J. Flooring system shall not be applied to sand-cement setting beds. Sand-cement beds shall be removed to structural concrete substrate and re-leveled/sloped as necessary to achieve grade and/or adequate drainage.

K. Flooring system shall not be applied to asphaltic or bitumen membranes, soft wood, aluminum, copper or fiberglass reinforced polyester/vinyl ester composites.

L. Application to glazed or vitrified brick and tile, structural wood, steel shall only be permitted with Manufacturer’s written recommendation.

3.2 SURFACE PREPARATION

A. Prepare surface to receive flooring systems in accordance with manufacturer's written instructions.

B. Remove dirt, oil, grease, wax, laitance, curing compounds, water-soluble concrete hardeners, and other surface contaminants. Remove sealers, finishes, and paints. Remove unsound concrete by appropriate mechanical means.

C. Concrete: Shall be cleaned and prepared to achieve laitance-free and contaminant-free, open textured surface by shot blasting or equivalent mechanical means (CSP level as per ICRI guidelines and manufacturer’s written recommendation).

D. Chemical Surface Preparation: Chemical surface preparation (acid etching) is unacceptable and will void Manufacturer’s warranty.

E. Control joints and cracks: Provide repair and treatment of control joints and surface cracks utilizing manufacturer’s standard materials and installation details. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D 4258.

F. Mask adjoining surfaces not receiving floor coating including floor drains, hangar door rails and other substrate penetrations to prevent spillage, leaking, and migration of coatings.

G. Prepare, treat, rout, and fill joints and cracks substrates. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D 4258.

H. Start epoxy floor coating application in presence of manufacturer's technical representative.

1. Verify that wet film thickness of each component coat complies with requirements every 100 sq. ft.
2. Prevent contamination and damage during application and curing stages.

3.3 APPLICATION

A. Mix and apply material with strict adherence to manufacturer’s written installation procedures and coverage rates.

B. Follow Manufacturer’s written recommendations on terminations and connections to walls, drains, doorways, columns, and floor-to-floor transitions.

C. Do not apply while ambient and substrate temperatures are rising.

D. Apply resinous flooring with care to ensure that no laps, voids, or other marks or irregularities are visible, and with an appearance of uniform color, sheen and texture, all within limitations of materials and areas concerned.

E. Match colors and textures of approved samples.

F. Install cove base 4” high with a coved-radius in accordance with manufacturer’s written instructions.

3.4 CLEAN UP

A. Disposal of this product, solution and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

B. Empty containers should be taken to an approved waste handling site for recycling or disposal.

3.5 PROTECTION

A. Freshly applied material should be protected from dampness, condensation, and water for at least 72 hrs.

B. Beware of air flow and changes in air flow. Introduction of dust, debris, and particles, etc. may result in surface imperfections and other defects.

C. Follow manufacturer’s written recommendation with respect to cure, wait time and return to service.

END OF SECTION

SECTION 09681 – CARPET TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes modular carpet tile at walk off areas of the entries or as scheduled.

B. Related Requirements:
1. Division 9 Section "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
1. Review methods and procedures related to carpet installation including, but not limited to, the following:
   a. Review delivery, storage, and handling procedures.
   b. Review ambient conditions and ventilation procedures.
   c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

A. Product Data: For the following, including installation recommendations for each type of substrate:
1. Carpet: For each type indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance.

1.5 SUBMITTALS

A. Product Data: For each product indicated.

B. Samples: For each carpet, and exposed accessory and for each color and pattern required.

C. Maintenance data.

D. Layout drawings at 1/8” scale minimum.

E. Dyelots: All carpet of the same type in continuous areas should be from the same dye lots.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

1.8 PROJECT CONDITIONS

A. General: Comply with CRI 104, Section 6.1, "Site Conditions; Temperature and Humidity."

B. Environmental Limitations: Do not install carpet until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

C. Do not install carpet over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by manufacturer.

D. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

E. Do not install carpet over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by carpet manufacturer.

F. Where demountable partitions or other items are indicated for installation on top of carpet, install carpet before installing these items.

1.9 WARRANTY

A. Carpet Warranty: Provide manufacturer’s standard form in which manufacturer agrees to replace carpet that does not comply with requirements or that fails within ten (10) years from date of Substantial Completion. Warranty does not include deterioration or failure of carpet from unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.

1.10 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet to include in maintenance manuals. Include the following:

B. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.

C. Precautions for cleaning materials and methods that could be detrimental to carpet.

1.11 EXTRA MATERIALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. Carpet tile attic stock shall be provided in original shipping boxes or wrapping and labeled for each area of use/installation.

2. Deliver all required overages and maintenance stock to Owner’s specified location prior to beginning installation. Attic stock shall be from the same dye lot as installed material.

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Basis-of-Design Product: Subject to compliance with requirements, provide Milliken Floor covering, or comparable product by one of the following:

1. Shaw.
2. Tandus.

B. Color and Pattern:
1. As scheduled and shown on the drawings or as selected by the Architect and Owner.

C. Pile Characteristic:
1. Milliken-Certified Wearon – Tufted-textured loop; 14.4 stitches/ inch

D. Primary Backing/Backcoating: PVC-Free WellBAC™ Comfort Cushion

E. Secondary Backing: Manufacturer's standard fiberglass reinforced thermo plastic composite material.

F. Size: 19.7 inches by 19.7 inches.

G. Stain Resistance/Soil Release: Soil and stain resistance shall be integral to carpet fiber or shall be applied per manufacturer standards.

H. Static Control: 3.5 KV when tested under Standard Shuffle test (70 degrees, 20% RH)

I. Flammability:

1. DOC-FF-1-70 Pill Test: Self Extinguishing.

2. Floor Radiant Panel: Meets NFPA Class 1 when tested per ASTM-E-648 glue down.

J. NBS Smoke Chamber NFPA 258: Less than 450 Flaming Mode.

K. Color Fastness:

1. Lightfastness - AATCC 16E-1982 - Dark color: Gray scale rating of 4.0 or better after 80 standard fading hours as compared to AATCC Gray Scale for evaluation change in color.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Edge/Transition Strips: Johnsonite – Vinyl “C” or “D” adaptor, or “T” molding for transition between carpet and flooring material transition, or extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints. Carpet to be flush with adjoining tile surface.

1. Schluter – “Reno-T” at equal height flooring transitions.

2. Schluter – “SCHIENE” at carpet to tile transitions.

3. Johnsonite CTA-XX-J 1/4” high x 2½” at perimeter of carpet tile, with mitered corners, between transition of polished concrete and carpet.

or

3. Johnsonite EG-XX-H 1/4” high x 2⅛” at perimeter of carpet tile, with mitered corners, between transition of hard surface, vinyl tile or sealed concrete.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
2. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
3. Raise subfloors at lobby areas to ensure the carpet is flush with finish floor of tile.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. General: Do not start work until work of other trades are substantially completed. Inspect surfaces to receive carpet and verify that all such work is complete to the point where this installation may properly commence. In the event of discrepancy, notify the Contractor. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved. Start of carpet installation indicates acceptance of subfloor conditions and full responsibility for completed work.

E. Materials: Inspect all goods to verify all goods uniformity, quality, color and texture against the approved samples prior to installation. Any discrepancy should be brought to the attention of the Contractor.

3.2 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions. Sequence tile installation per manufacturer's instructions to ensure a uniform appearance.

B. Installation Method: As recommended in writing by carpet tile manufacturer.

C. Maintain dye lot integrity. Do not mix dye lots in same area.

D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

G. Install pattern parallel to walls and borders.

H. Roll floor with 75 to 100 pound roller per manufacturer's requirements.

I. Blend and enhance the seams, and trim face yarn as required.

J. General: In addition to the requirements and recommendations of the Carpet Manufacturer, the following criteria shall be adhered to:

1. Installation layout shall enable future replacement, especially in large open areas and traffic paths, unless specifically indicated in writing by owner or owner's representative.
2. No carpet tile pieces smaller than 6" in width or length shall be used.
3. Seams occurring at doors of different types of carpet shall be parallel to closed door, and be centered directly under the closed door.
4. Flooring Trade Contractor is responsible for trimming all loose yarn and fuzzy edges of carpet tiles.
5. All cutting of carpet for telephone and electrical outlets shall be the responsibility of the Flooring Trade Contractor.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove and dispose of debris and unusable scraps.

3. Vacuum carpet using two motor, top loading, upright commercial machine with brush-only element, utilizing a high filtration dust bag. Remove spots in accordance with carpet manufacturer's guidelines and replace carpet where spots cannot be removed. Remove any protruding face yarn using sharp scissors. Be certain to trim any loose yarns or fibers at all seams.
4. Following cleaning and vacuum, carefully protect the carpeting from soiling and damage until final acceptance. Protection shall be accomplished by using approved protection paper. Edges shall be lapped 6 inches and secured with non-asphaltic tape. Covering shall be kept in repair and damaged portions replaced during the construction and move-in period.
5. Maintenance Materials: Deliver usable, uncut carpet tiles to Owner's designated storage space, properly packaged and identified. Dispose of smaller pieces as construction waste.

B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations".

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09681

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SECTION 09700 – GRAPHIC MURAL WALL FINISHES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 Summary

A. Section Includes: Pre--engineered graphic mural wall system including wall panels, mounting extrusions, bases and frame. Wall system comes “ready to install” with fasteners, adhesives, and other materials required for a complete assembly. Fasteners shall be concealed type.

B. Related Sections:

1. Section Rough Carpentry

1.3 References

A. ASTM E84 – Surface Burning Characteristics of Building Materials.

1.4 Submittals

A. Provide submittals in accordance with Section– Submittal Procedures.

B. Submit manufacturer’s shop drawings, installation drawings, installation instructions and maintenance instructions, including images, sizes of panels, glass joints, and photographic proofs and image blocking.

C. Submit environmental impact data for all materials.

D. Submit samples no less than 4" x 4" for all specified material finishes.

E. Submit panel edge extrusion samples no less than 4” of specified finish.

F. Submit mock--up of wall system and photographic image no less than 12” x 12”.

G. Manufacturer information:

1. Provide overview literature describing manufacturer’s overall scope of products and manufacturing capabilities.
2. Provide URL for manufacturer’s web site; web site must provide access to technical data, images and general product information.
3. Cleaning and maintenance data.

1.5 Quality Assurance

A. Manufacturer Qualifications

1. Minimum 10 years’ experience in the manufacture of architectural surface materials.
2. Minimum 10 years’ experience in the fabrication of wall systems.

3. Provide reference list of at least 20 public space projects currently using walls fabricated by the manufacturer.

B. Installer Qualifications

1. Minimum three years' experience in the installation of wall systems.

1.6 Delivery, Storage and Handling

A. Deliver materials to installation site in manufacturer's original packaging. Handle products in accordance with manufacturer's instructions. Store in dry, secure location, protected against direct sunlight and excessive heat. Protect finished surfaces with strippable film.

1.7 Warranty

A. Provide manufacturer's standard warranty.

1. Warranty terms: two years against defects in materials and workmanship.

Part 2 PRODUCTS

2.1 Manufacturer

A. Basis of Design Custom Photographic Image-Glass Wall System manufactured by:

1. Skyline Design Architectural Glass & Products
2. Contact: Dale Ginger
   1240 N. Homan
   Avenue
   Chicago, IL 60651
   Phone: 773-208-6400
   Fax: 773-278-3548
   or, Architect and other approved equal

2.2 Wall Panels

A. General

1. Provide interlocking grid panel system with inset panels mounted to extruded aluminum frames on structural backer. The recommended substrate is 3/4″ fire rated plywood.
2. Panel configuration: Wall System (standalone panel and Custom Photographic Image Glass Wall Systems) with Minimal style panel frames. Reference drawings for panel layout and reveal spacing.
3. Provide inset panels in the finishes specified.
4. Weight per square foot: average 2.40 lbs. to 3.04 lbs.
5. Frames are extruded aluminum.
6. Panels shall have an ASTM E84, class A flame spread rating.
7. Panels shall not harbor bacteria and shall withstand use of disinfectants.

B. Inset Materials

1. Laminated Glass Panels

a. Material: PPG Starfire glass comparable to UL 723, ANSI/NFPA No. 255, and UBC No. 8--1.

C. Base

1. a. Stainless Steel Panels

b. Material: Stainless Steel.

D. Panel Frames and Outside Corner Extrusion

1. Material: Extruded, anodized aluminum
2. Finish: Clear

E. Reveals

1. Material: Extruded, anodized aluminum
2. Finish: Black

Part 3 EXECUTION

3.1 Preparation

A. Protect wall finishes, fixtures and equipment from damage caused by work of this Section.

3.2 Installation

A. Install in accordance with wall system manufacturer's instructions.

3.4 Cleaning and Protection

A. Remove strippable film. Clean exposed surfaces in accordance with manufacturer's instructions.

B. Protect exposed surfaces from damage by subsequent construction.

END of SECTION 09700

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SECTION 09911 – EXTERIOR PAINTING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surface preparations, painting, and finishing of exposed exterior items and surfaces.

1. Surface preparation, priming and finish coats specified in this Section are in addition to shop priming and surface treatment specified under other Sections.

B. Paint exposed surfaces whether or not colors are designated in “schedule” except where a surface or material is indicated not to be painted or is to remain natural. Where an item or surface is not mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect and Owner will select from standard colors or finishes available.

1. Painting includes field painting exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.

C. Painting is not required on pre-finished items, finished metal surfaces, concealed surfaces, operating parts, or labels.

1. Labels: Do not paint over Underwriter’s Laboratories, Factor Mutual or other code-required labels, or equipment name, identification, performance rating, or nomenclature plates.

D. The Contractor shall apply damp proofing to the interior face of the perimeter new exterior CMU (where walls are to be concealed) walls to reduce moisture intrusion during the course of construction, until the final exterior paint system is applied.

E. Non-Galvanized Structural Steel to receive fire proofing as scheduled, shown, or required by the FBC, shall be primed by the fabricator but not finished painted.

F. Coating Maintenance Manual: upon conclusion of the project, the Contractor or paint manufacture/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams “Custodian Project Color and Product Information” report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages,

Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.3 GENERAL

A. Furnish all labor, materials, tools, equipment, etc. and services necessary and incidental to the complete fabrication, furnishing and erection of this Section as shown, noted, detailed and reasonably implied on the drawings and in the specifications.

B. Note that warranty requirements are an integral part of the work in this Section and all criteria listed per Article 1.9 of this Section apply.

C. Note that the requirement for prime and finish painting may be included in various Mechanical, Electrical, Plumbing, Fire Protection, and Structural sections of this specification. Coordination is required.

D. The Paint Manufacturer shall also provide their own company paint and coatings specifications accompanied by Product Data and Material Safety Data sheets as part of Article 1.6 Submittals below. It is the intent of these Specifications to establish quality and workmanship detail, and define both generic systems and the extent of the caulking and coatings applications in a general way. It shall then be the responsibility of the Paint Manufacturer to attach and comply with their own company paint and coatings specifications for the precise primers and finish coats and application procedure and methods to ensure this criteria is followed.

E. In the event of discrepancy, the Paint Manufacturer’s specifications shall take precedence over these specifications. Notify the Architect in writing for each and every specific situation as it occurs prior to application of any material.

F. The Paint Manufacturer shall exercise rights of approval in the selection of a competent applicator, which meets their standards for quality workmanship and levels of experience.

G. Although the Paint Manufacturer may not actually manufacture caulking compounds equivalent to these specified herein, they shall be responsible for this phase of work as described in Article1.9 of this Section.

1.4 RELATED SECTIONS

A. Coordinate work of this Section with work of other Sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other Sections, including:

1. Division 5 Section “Metal Fabrications” for shop priming ferrous metal.
2. Division 7 Section “Sprayed Fire-Resistive Materials.”
3. Division 8 Section “Steel Doors and Frames” for shop priming steel doors and frames.
4. Division 9 Section “High Performance Coatings”

1.5 DEFINITIONS

A. “Paint” includes coating system materials, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

1.6 SUBMITTALS

A. Data: Submit product data under provisions of Section 01300 – Shop Drawings, Product Data and Samples to include the Paint Manufacturer's application instructions for all products intended for work in this Section.

B. Painting Schedule: Shall include, but not limited to the following:

1. Pretreatment requirements for each paint system.

2. Spread Rate - gallons per square foot.

3. Wet film thickness in mils.

4. Dry film thickness in mils.

5. Total dry film thickness in mils.

6. Format identical to Article 3.9 PAINT SCHEDULE

C. Samples:

1. Submit manufacturer's standard color chips. Architect and Owner will select colors from manufacturer's color chip brochures. Contractor to prepare color chip samples specified herein before using selected colors. Architect and Owner will make final selection from such color chips and prepare color schedule for Contractor's use.

2. Do not proceed with any painting work until field sample panels of each paint system specified are applied and reviewed by the Architect and Owner.

D. Applicator Certification: Written acceptance of the applying company per Article 1.9 D. of this section.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Section 01600 – Materials and Equipment and Section 01620 – Storage and Protection.

B. Deliver all materials to the job site in original, new and unopened packages and containers bearing the manufacturer's name and label, and the following

information:

1. Product name or title of material,

2. Product description (generic classification or binder type).

3. Manufacturer's name, stock number and date of manufacture.

4. Contents by volume, for major pigment and vehicle constituents,

5. Thinning instructions,

6. Application instructions,

7. Color name and number,

8. No materials other than types specified or approved may be delivered to project site. Unapproved materials shall be removed from project site immediately.

C. Storage and Use of Premises:

1. The applicator shall confine his apparatus, materials storage and operations of his workers to limits indicated by Contractor. All materials used on the job shall be stored in a single place designated by the Contractor. Such storage shall be kept clean and the applicator shall be liable for damage to surrounding areas.

2. Inflammable material and/or fire hazard waste shall be stored, handled and used in an approved manner and shall be removed from the site daily.

D. Store materials not in use in tightly covered containers in a well ventilated area at a minimum ambient temperature of 45 degrees F., or as required by the manufacturer. Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

2. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.8 JOB CONDITIONS

A. Paint only in dry weather when temperature is 50 degrees F or higher. Stop exterior work early to permit paint film to set up before condensation, caused by night temperature drops, occur. Do not begin painting until surfaces are moisture free.

B. Do not varnish or enamel in direct sunlight.

C. Keep paint at room temperature.

D. Sweep dust, dirt and debris away before painting.

E. Execute work in accordance with label directions. Coating applications shall be made in strict conformance to this specification and to the manufacturer's paint instructions on the labels and product data sheets.

F. Paint only dry wood (less than 15 percent moisture). Defer painting until moisture content meets manufacturer's recommendations.

G. Environmental Requirements:

1. Measure moisture content of surfaces using an electronic moisture meter. Do not apply coating unless moisture content of surfaces is below the manufacturer’s recommendations.

2. Paint PH tests shall be taken prior to painting subcontractor beginning his work. PH level to be acceptable to paint manufacturer and subcontractor prior to paint application. Costs of tests to be paid by painting contractor. Provide written documentation of all test results immediately to on-site General Contractor’s superintendent.

3. Strictly follow manufacturer’s recommendations pertaining to environmental conditions.

H. All work shall be accomplished by skilled workmen familiar with and trained to do this type of work and they shall be further qualified to operate or use the equipment and rigging needed to accomplish this work.

I. Materials shall be applied evenly and free of runs, sags, or pinholes.

J. Type and amount prescribed for thinners, solvents, cleaners, etc. to be confirmed by and based on the Paint Manufacturer's written recommendation and approval.

K. All application tools and equipment shall be in good working order and suitable for proper application. All surrounding areas shall be fully protected against damage during each stage of the painting project. All exterior and interior substrates designated not to receive paint coatings shall be kept free of paint residue, e.g. windows, etc.

L. Normal safety signs, necessary lighting and temporary fencing around work areas shall be installed and maintained in accordance with OSHA requirements while work is in progress.

M. Where spray painting has been approved by the Architect, this applicator shall protect all adjacent materials and surfaces by covering entire said areas with approved protective materials. Overspray will not be accepted and, if it occurs,

shall be cleaned up properly and promptly.

N. The applicator shall submit written evidence of insurance coverage of an adequate amount to cover the cost of cleaning and/or repairing vehicles and other property which may be damaged by his work. The applicator shall use all precautions to avoid paint movement and shall notify the Contractor to have vehicles removed from susceptible areas.

O. A progress schedule shall be furnished by the applicator for approval and shall be based on the contract completion date. Applicator shall advise the Contractor of those areas in which work is to be performed 1 week in advance of the work schedule to permit the Contractor to prepare for the work, advise employees, move vehicles, etc.

1.9 QUALITY ASSURANCE

A. Paint Coordination: Provide finish coats which are compatible with prime paints used. Review other sections of these specifications in which prime and/or finish paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information on characteristics of finish material proposed for use, to ensure compatible prime coats are used. Provide barrier coats over incompatible primers or remove and prime as required. Notify the Contractor in writing of any anticipated problems using specified coating systems with substrates primed by others.

B. Examine specification sections of their trades for painting requirements, provisions therein affecting work of this Section.

C. Materials or work left unfinished by requirements of such other specifications but which are required to be painted shall be painted, finished to completion as part of work of this Section.

D. The applicator's qualifications, experience, etc., require the written approval and acceptance by the Paint Manufacturer.

E. Material Quality: Provide the manufacturer’s best quality paint material of the various coating types specified. Paint material containers not displaying manufacturer’s product identification will not be acceptable.

1.10 INSPECTION

A. Applicator must examine the areas and conditions under which painting work is to be applied and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Applicator.

B. Starting of painting work will be construed as the Applicator's acceptance of the surfaces and conditions within any particular area.

C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to the formation of a durable paint film.

D. Dry film thickness will be checked with a properly calibrated Nordson Mikrotest Dry Film Thickness Gauge or by other specifically approved instruments.

E. It will be the Applicator's responsibility to own and use a wet film thickness gauge to check his application thickness as he proceeds.

F. Small sample areas of each phase of work shall be done and checked by the Paint Manufacturer's representative. This will serve upon acceptance by the Architect and Owner as the job standard for remainder of that phase of work. This will also prevent misunderstanding as to interpretation of this specification's standards.

G. The Applicator shall advise the Paint Manufacturer's representative and Architect with enough lead-time prior to beginning each phase of work in order for inspection to not cause a delay in the work of the Applicator.

H. The Paint Manufacturer's representative shall be required to submit written reports to the Architect, Owner, Applicator and Contractor on the progress of satisfactory applications that will include initial job sample applications, and at least bi-weekly reports, that all work is being accomplished in accordance with his approval. These reports shall be a required attachment to each applicable Application for Payment. (Note that they apply to painting work only.) Refer to Section 00950 – Quality Assurance.

I. A final report to the Architect shall notify all parties that the completed work has been done in accordance with the manufacturer's recommendations, and the warranty period commences at the date of substantial completion. Acceptance must be in writing and presented no later than 10 days from receipt of final report, unless a written notice of specification deficiencies is necessary. Under such circumstances, the deficiencies shall then be corrected and new letters of completion and acceptance shall be exchanged.

1.11 SURFACE PREPARATION

A. Each surface shall be cleaned and prepared as specified in accordance with the Paint Manufacturer's surface preparation recommendations and requirements. The applicator is responsible for the finish of his work. Should any surface be found unsuitable to produce a proper paint or sealant finish, the Contractor shall be notified in writing and no material shall be applied until the unsuitable surfaces have been made satisfactory.

B. All exterior surfaces to be painted shall be cleaned to remove dirt, mildew, chalked paint and any foreign materials deterrent to the new finish and allowed to completely dry before painting.

C. Cracking that cannot be bridged by the paint film shall be brought to the attention of the Contractor who shall then direct repairs by the proper party.

D. Unprimed metals shall be mechanically hand tooled to bright metal and primed with a universal rust inhibitive primer as recommended by the Paint Manufacturer.

E. Painted wood surfaces shall be carefully inspected for evidence of deterioration or surface imperfections. Sandpaper any hard, glossy surface to ensure proper adhesion. Fill nail holes, imperfections and cracks with putty. Edges, corners, and raised grain shall be eased by sanding. Each coat required shall be sanded except the last. For surfaces scheduled to receive a prime coat only, sand, and re-prime after initial coat as required to conceal any defects due to insufficient sealing. Wood trim that is scheduled to be painted shall be spray painted; brush painting will not be acceptable.

F. Any loose and scaling shop painted item shall be cleaned by hand wire brushing or other suitable power tool cleaning as per SSPC-SP2 “Hand Tool Cleaning” or SSPC-SP3 “Power Tool Cleaning” standards then spot primed per the paint manufacturer's instructions.

G. Masonry and Stucco Repair, Patching and Caulking/Sealant Procedure:

1. Prior to any caulking or crack repair, all substrates must be cleaned to remove all mildew, dirt, loose or peeling paint, or any other foreign matter. Allow proper drying time of substrates before application of the products. Cracks shall be primed with a thinned solution of Pigmented Bonding Coat before any patching or caulking material is applied.

2. All construction joints and expansion joints shall be carefully inspected and cleaned prior to painting to assure desired adhesion to both surfaces.

3. Sound out all masonry/stucco cracks to determine bond to substrate. If hollow sound or disbonding is evident, immediately notify the Contractor in writing and proceed per Article 1.7 A. of this Section.

4. Concrete primer and concrete patching materials shall be approved by The Paint Manufacturer's representative and Architect before application.

5. Determine the alkalinity and moisture content of the surfaces to be painted by performing appropriate tests. If the surfaces are found to be sufficiently alkaline, to cause blistering and burning of the finish paint, correct this condition before application of paint. Do not paint over surfaces where the moisture content exceeds that permitted in the manufacturer's printed directions. Plaster shall be neutralized with manufacturer's Plaster Surface Conditioner; burned spots shall be touched up.

H. Galvanized Metal Surfaces: Galvanized metal surfaces shall be pretreated and wiped with a biodegradable cleaner to remove any dirt, oil or grease. The galvanized surfaces shall be prepared and primed prior to application of the finish coat(s) of paint as recommended by the paint manufacturer.

I. Hollow Metal Exterior Door Frames: The back of all exterior door frames shall be

primed with a bituminous mastic primer, from the bottom of the door to 18 inches above finish floor.

1.12 WARRANTY

A. Work performed to Specifications will be warranted as follows:

1. The Paint Manufacturer warrants to the building Owner and to the Contractor that for five (5) years after the date of substantial completion for the application of all coatings scheduled in Article 3.9 "Painting Schedule", Section 09911 – Exterior Painting of the project specifications and installed by the Painting Contractor, these coatings will be free from defects in manufacture and will conform to manufacturer's specifications for these products. In addition, if the Contractor applies each coating in accordance with the manufacturer's specification for application as noted below, the Paint Manufacturer warrants to the building Owner and to the Contractor that the product so applied will perform satisfactorily for three (3) years under installed conditions and will provide normal and customary protection of the substrate and will not crack, peel or blister for five (5) years under installed conditions. The warranty applies only to above-grade coated surfaces and does not apply to conditions caused by structural defect, building settlement or building movement as determined and certified by the project Structural Engineer, vandalism, negligence or other causes beyond the Paint Manufacturer's control.

2. The Paint Manufacturer representative will be given full and complete access to the job site during all stages of the construction. The paint manufacturer's representative will:

a. Inspect all surfaces prior to paint application.
b. Provide detailed written specifications for surface preparation, sealing, curing time, temperature, coatings specifications, or special application procedures for each scheduled coating.
c. Provide all reports, testing, monitoring, checking, etc. as listed in the project specification Section 09911 - Exterior Painting for this project.

4. Any claim made under this warranty must be in writing within thirty (30) days of the alleged product failure. "The paint manufacturer makes no other warranties, express or implied," including without extending or limiting the duration provided by law of any implied warranty or warranty of fitness for purpose or use." In the event that the installed product fails to conform to the above warranties, written notification will be forwarded to the Paint Manufacturer as noted above.

Within thirty (30) days, a response detailing the Paint Manufacturer's analysis and recommendations including the Contractor's schedule for required remedial actions will be provided for coordination with the Architect and Owner. Any recoated areas will be warranted only for the remainder of the original warranty period, which shall not be extended as a

result of the supply of replacement materials or labor.

Provide a signature element that includes the name and title of the signatories for the Paint Manufacturer, the building Owner, the Contractor, the date of substantial completion/warranty effective date, and the project name and address.

By issuing this warranty, the Paint Manufacturer and this contractor confirm that said warranty shall include and cover the Paint Manufacturer's costs relating to corrective or replacement paint, coatings or sealant work needed to re-establish the integrity of the paint for this project. This includes all labor and materials. This warranty shall apply to excessive cracking, chipping, peeling, or disbonding of the paint from any substrate. It is understood that minor fading is expected; however, any catastrophic discoloration or loss of color shall also be covered by said warranty.

1.13 MOCK-UPS

A. Prepare a field sample application of each scheduled paint color (mock-up) at locations approved by the Architect. Each mock-up shall cover approximately 4 square feet of area (2'-0" by 2'-0"). Apply mock-ups in quantities of paint colors selected and furnished by the Owner or Architect. Upon approval of preliminary colors by the Owner and the Architect, furnish final mock-ups.

B. At finished construction locations as directed and approved by the Architect, provide final painting field mock-ups to cover approximately 100 square feet of area (10'-0" by 10'-0") using final colors per Article 1.10 above. Mock-ups are to represent conditions of finished work including one typical horizontal to vertical interface for both interior and exterior conditions as well as typical wall surfaces.

C. Mock-ups approved by the Owner shall constitute standard of acceptance for remaining work. Do not disturb or alter mock-ups during remaining construction.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Basis of Design Product: Subject to compliance with requirements, provide Sherwin-Williams Company (The) or comparable product by one of the following:

1. PPG Paints.
2. Porter Paints
3. Devoe/ICI Paints

B. Manufacturers: Subject to compliance with the project requirements and specifications, provide products specified below or an Architect approved equal. The burden of proof of equality is on the proposer.

C. Substitutions: Where a selected manufacturer or product has been specified, and equal or superior product or change in manufacturer may be accepted only upon

review and written acceptance by the Architect. All such proposed changes or substitutions shall be submitted to the Architect with appropriate manufacturer's specifications and literature, environmental compliance assurance and independent laboratory testing data, and side by side comparative for each product type. The Architect's decision whether a product or manufacturer is equal or superior to the one specified shall be final. Refer to Division 01 for additional product substitution requirements.

A. All materials used in this paint contract shall be as manufactured and delivered on the job in original, sealed containers.

B. The paints herein specified are known to be suitable and will be enforced as the required standards of quality of this work.

C. Extra Materials: Provide 10-gallons of each selected color for maintenance stock to the Owner.

D. Provide a final typed painting schedule to be included in Section 01700 – Project Closeout with maintenance manuals.

E. All coatings shall contain the mildewcide M-1 additive, or paint manufacturer's approved equal, as manufactured by Jomaps, Inc. The quantity of the additive shall be per the manufacturer's requirements in order to provide mildew resistance.

F. Damp proofing to be applied to the interior face of the perimeter exterior CMU walls shall be "Dry-Lock", or approved equal.

2.2 COLORS

A. Colors of the exterior building envelope shall be as selected by the Owner, and the Architect, Color schedules shall be furnished to the Applicator before application of prime coats. Prime coats will be tinted to be a slightly different shade compared to the succeeding coat.

B. Colors of the storage and mechanical rooms will be a single color; antique white or similar to be approved by the Owner and Architect.

PART 3 -EXECUTION

3.1 INSPECTION

A. Prior to installation of the work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence. Painting contractor shall notify the General Contractor in writing if repair or replacement of any damaged or otherwise unacceptable substrates exist or is necessary. Verify that painting may be completed in strict accordance with the project requirements/specifications and with the manufacturer's recommendations. Do not proceed until all such discrepancies have been fully resolved.

B. All work will be inspected and approved in writing, on a regular basis by the paint manufacturer's representative. A schedule of inspections required of the manufacturer will be reviewed and coordinated with the General Contractor prior to the commencement of the painting work.

1. The minimum inspection requirements prior to start of each area or drop are:

a. Verify that surfaces are ready to receive work.

b. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

c. Verify that substrate moisture content and PH do not exceed recommended conditions as predetermined by all parties involved.

d. Examine all caulk joints for use of appropriate sealant, adequate application and adequate adhesion.

2. Minimum testing during application:

a. Moisture.

b. PH test.

c. Wet mil test of base application.

d. Dry mil test of base application.

e. Wet mil test of finish coat(s).

3. Minimum upon completion:

a. Dry mil test of completed application.

b. Summary report of all testing and copies of all field testing reports.

3.2 SURFACE PREPARATION

A. General: Clean and prepare surfaces to be painted in accordance with manufacturer's printed instructions and current recommendations for each particular substrate condition and as specified.

1. Notify the Architect and General Contractor in writing of problems anticipated using specified finish coat material with substrates primed by others.

2. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and items in place that are not to be painted, or provide suitable protection prior to surface preparation and painting. Remove items if necessary for complete painting of the items and adjacent surfaces. Following completion of painting operations in each space or area, reinstall items removed using workmen skilled in the trades involved.

3. Clean surfaces before applying paint or surface treatment. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

B. Cementitious Surfaces: Prepare concrete, concrete masonry, and similar surfaces to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. Use abrasive blast cleaning if recommended by paint manufacturer.

1. Determine alkalinity and moisture content of surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

C. Wood: Clean surfaces of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper as required. Sand surfaces exposed to view smooth, and dust off.

1. Scrape and clean, small, dry, seasoned knots and apply a thick coat of white shellac or other recommended knot sealer, before application of primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.

2. Prime, stain, or seal wood to be painted immediately upon delivery. Prime edges, ends, faces, undersides, and backsides of wood.

3. When transparent finish is required, use spar varnish for back priming.

4. Seal tops, bottoms, ends and cutouts of unprimed wood doors and pre-engineered wood beams with heavy coat of varnish or sealer immediately upon delivery.

D. Ferrous Metals: Clean non-galvanized ferrous metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council (SSPC).

1. Touch-up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.

E. Galvanized Surfaces: Clean galvanized surfaces with non-petroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pre-treatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

G. Doors: Door bottoms and tops shall be primed and painted prior hanging the doors. The Contractor shall coordinate the timing of the work to ensure that this process is completed prior to hanging the doors within the frame.

3.3 GENERAL

A. Protect work of other trades, whether to be painted or not, from damage by painting work. Mask hardware as required to protect, i.e. brass door butts, etc.

B. Provide “Wet Paint” signs where appropriate to protect uncured finishes.

C. Spray applications, when used, shall produce the equivalent hiding quality per coat as brush or roller-applied coats. Do not double back with spray equipment for the purpose of building up film thickness of two coats in one pass. All spray applied paint shall be “back rolled” to assure proper coverage and uniformity.

D. The first and second coats of paint will be of slightly different shades for inspection purposes.

E. Viscosity and thickness tests may be taken by the General Contractor or manufacturer. Cost of tests will be borne by the subcontractor if found to be below specification requirements.

F. Painter to protect floors from over-spray and to clean if necessary.

G. All weather stripping around doors, windows and other openings shall not be painted. Special care shall be taken to properly “mask” and protect these components from all painting operations.

H. Subcontractor shall provide adequate painting protection for all of the trades work throughout the painting operations. Once surrounding services have been painted and protection is no longer needed, temporary protection shall be removed.

J. Clean all surfaces of foreign matter prior to any paint application.

3.4 MATERIALS PREPARATION

A. Mix and prepare paint in accordance with manufacturer’s directions. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.

B. Use factory mixed colors, shade, and tints. Job mixing permitted only with specific written approval of the Paint Manufacturer's representative and the Architect.

C. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing, and application of paint in a clean condition, free of foreign materials and residue.

D. Stir materials before application to produce a mixture of uniform density, and stir as required during the application of the materials. Do not stir surface film into the material. Remove the film and if necessary, strain the material before using.

E. Use only thinners approved by manufacturer, and only within recommended limits.

3.5 APPLICATION

A. Apply paint of consistency recommended by and in accordance with the paint manufacturer's data sheets. Use tools and techniques best suited for the substrate and type of material being applied per manufacturer's data sheets.

B. Paint interior surfaces of ducts where visible through registers or grilles, with a flat, non-specular black paint as per paint schedule.

C. Finish exterior and interior doors on tops, bottoms and side edges the same as the exterior faces, unless otherwise indicated.

D. Exposed pipes and ductwork on or near walls or ceilings that are to be painted shall be painted, unless otherwise indicated.

E. Orange peel/rough finish on metal or wood surfaces shall not be permitted.

F. Provide primer coats for all walls and trim to receive a faux finish. Faux finishes are not included in this contract.

G. The number of coats and film thickness required is the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce a smooth, even surface, in accordance with the manufacturer’s directions.

H. Apply additional coats when undercoats show through final coat of paint, until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry-film-thickness equivalent to that of flat surfaces.

I. The term “exposed surfaces” includes areas visible when permanent or built-in fixtures, convector covers, grilles and similar components are in place. Extend coatings in these areas to maintain system integrity and provide desired protection.

J. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.

K. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.

L. Finish exterior doors on tops, bottoms, and side edges same as exterior faces. The back of hollow metal-exterior door frames shall be finished with a mastic primer, from the bottom of the door to 18 inches above the finish floor.

M. Omit primer on metal surfaces that have been shop-primed and touch up painted.

N. Sand lightly between each succeeding enamel or varnish coat.

O. Scheduling Painting: Apply first-coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable, and before subsequent surface deterioration. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure and where application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

P. Minimum Coating Thickness: Apply materials at the manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by the manufacturer.

Q. Block Fillers: Apply block fillers to concrete masonry unit at a rate to ensure complete coverage with pores filled.

R. Prime Coats: Before application of finish coats, apply a prime coat of material as recommended by the manufacturer to material required to be painted or finished, and has not been prime coated by others.

1. Recoat primed and sealed substrates where evidence of suction spots or unsealed areas in the first coat appears, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

S. Brush Application: Brush-out and work brush coats into surfaces in an even film. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Draw neat glass lines and color breaks.

1. Apply primers and first coats by brush unless manufacturer's instructions permit use of mechanical applicators.

T. Mechanical Applications: Use mechanical methods for paint application when permitted by manufacturer's recommendation, governing ordinances, and trade union regulations.

1. Wherever spray application is used, apply coat to provide the equivalent hiding of brush-applied coats. Do not double-back with spray equipment building-up film thickness of two coats in one pass unless recommended by the manufacturer.

U. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirement.

3.6 FIELD QUALITY CONTROL

A. The Owner reserves the right to engage the services of an independent testing laboratory to sample and test paint material being used. Samples of material delivered to the project will be taken, identified, sealed, and certified in the presence of the Contractor.

1. The testing laboratory will perform appropriate tests as required by the Owner.

2. If tests show material being used does not comply with specified requirements, the Contractor may be directed to stop painting pay for testing, repaint surfaces coated with reject paint, remove rejected paint from previously painted surfaces if, upon repainting with the specified paint, the two coatings are non-compatible.

3.7 CLEAN UP AND PROTECTION

A. During the progress of the work, remove from the site all discarded paint materials, rubbish, cans, and rags at the end of each workday.

B. Remove splashed, dropped, spattered, and spilled paint from hardware, fixtures, glass, and building parts.

C. Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing, or replacing, and repainting as acceptable to the Architect.

D. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.

E. At the completion of work of other trades, and after notification in writing to the Contractor, touch-up and restore all damaged or defaced painted surfaces. A touch-up allowance will be included in final contract.

3.9 PAINT SCHEDULE

3.9.1 COLOR SCHEDULE EXTERIOR PAINTING

Exterior Building Colors to be selected by the Architect
Color “A” To Be Determined
Color “B” To Be Determined
Color “C” To Be Determined
Color “D” To Be Determined
Color “E” To Be Determined
Color “F” To Be Determined
Color “G” To Be Determined
Color “H” To Be Determined

Color “I” To Be Determined
Color “HA” To Be Determined
Color “HB” To Be Determined
Color “HC” To Be Determined

3.9.2 PAINT SYSTEMS AND COATING SCHEDULE

Refer to the Exterior Elevations for the color scheme and various painted material types (letter designation) scheduled below. Provide finish scheduled below if not indicated on the drawings and/or finish schedule.

A. THE SHERWIN WILLIAMS COMPANY: Attached are the Material Supplier's detailed prime and finish coats specifications. This defines primer and finish coat names, product number designations, and thickness. Because this supplier is providing a warranty, strict adherence to product Data Sheet and label instructions shall be followed. The following schedule shall not be considered as entirely inclusive, but construed as a general guide for complete painting of buildings, structures, etc., including, but not limited to, storage spaces, recesses, returns, reveals, soffits, haunches, forming part of a particular surface, room or space, pipes, conduits, duct work, panels, mechanical equipment, etc.

FINISH TYPE		Wet Film Thickness MILS	Dry Film Thickness MILS	Spread Rate SF/Gal.
A1. Concrete Floor Stain				
1st coat	H&C Concrete Sealer Solid Color Solvent Based Thinned 25%			175
2nd coat	H&C Concrete Sealer Solid Color Solvent Based Full Strength			200
A2. Parking Stripes				
1st coat	Sherwin Williams Pro/Mar Traffic Marking Paint B29 Series 4” Stripe	14.0	7.0	350
2nd coat	Sherwin Williams Pro/Mar Traffic Marking Paint B29 Series	14.0	7.0	350
	TOTAL DRY MILS		14.0	
A3. Exterior Concrete				
1st coat	Sherwin Williams Loxon Concrete & Masonry Primer/Sealer A24W300	8.0	3.2	200
2nd coat	Sherwin Williams Loxon Acrylic Coating A24W300	8.0	3.8	200
	TOTAL DRY MILS		7.0	

C1. Exterior Plaster (Stucco) and Ceilings

1st coat	Sherwin Williams Loxon Concrete & Masonry Primer/Sealer A24W300	8.0	3.2	200
2nd coat	Sherwin Williams Loxon Acrylic Coating A24W300	8.0	3.8	200

TOTAL DRY MILS 7.0

D1. Exterior Gypsum Board Ceilings

1st coat	Sherwin Williams Loxon Concrete & Masonry Primer/Sealer A24W300	8.0	3.2	200
2nd coat	Sherwin Williams A-100 Exterior Gloss Latex, A8 Series	4.0	1.3	300

TOTAL DRY MILS 4.5

E1. Structural Steel

1st coat	Sherwin Williams Kern Komick Universal Metal Primer B50 Series	6.0	3.0	200
2nd coat	Sherwin Williams A-100 Exterior Gloss Latex, A8 Series	4.0	3.0	200

TOTAL DRY MILS 4.3

E2. Structural Steel Touch-Up

1st coat	Sherwin Williams Kern Komick Universal Metal Primer B50	6.0	3.0	200

E3. Unfinished Ferrous Metals

1st coat	Sherwin Williams Kern Komick Universal Metal Primer B502	6.0	3.0	200-250
2nd coat	Sherwin Williams Pro Industrial High Performance Acrylic, B66-650 Series	6.0	2.5	200

TOTAL DRY MILS 5.5

E4. Exterior Galvanized Metal
(If Galvanized Metal is Surface Treated, must Solvent Clean with Biodegradable Cleaner)

1st coat	Sherwin Williams Pro Industrial Pro-Cryl Universal Primer, B66-310 Series	7.5	3.0	264
2nd coat	Sherwin Williams Pro Industrial High Performance Acrylic, B66-650 Series	6.0	2.5	200

TOTAL DRY MILS 5.5

E5. <u>Galvanized</u>

1st coat	Sherwin Williams Pro Industrial Pro-Cryl Universal Primer, B66-310 Series	7.5	3.0	264
2nd coat	Sherwin Williams A-100 Gloss A-8 Series	4.0	1.3	3
3 rd coat	Sherwin Williams A-100 Gloss A-8 Series	4.0	1.3	300

TOTAL DRY MILS 5.6

E6. Galvanized Surface touch-up

1st coat	Sherwin Williams Pro Industrial Pro-Cryl Universal Primer, B66-310 Series	7.5	3.0	264

E7. Unprimed Ferrous Metal and Overhead Grille Brackets

Pretreatment: Clean in accordance with Paragraph 1.11D.

1st coat	Sherwin Williams Kern Komick Universal Metal Primer B50	6.0	3.0	200
2nd coat	Sherwin Williams Pro Industrial High Performance Acrylic, B66-600	6.0	2.5	200

TOTAL DRY MILS 5.5

H1. Wood Stain/Sealer-Semi Transparent

Pretreatment: Prepare surface in accordance with mfg. requirements.

1st coat	Sherwin Williams WoodScapes® Semi-Transparent Stain-Color TBD, A15 Series			200
2nd coat	Sherwin Williams WoodScapes Semi-Transparent Stain-Clear, A15 Series			200

S1. Exterior Sealant

Stampede-Acrylic Urethane Sealant

END OF SHERWIN WILLIAMS COMPANY PAINT SYSTEMS SCHEDULE

END OF SECTION 09911

SECTION 09912 – INTERIOR PAINTING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surface preparations, painting, and finishing of exposed interior items and surfaces.

1. Surface preparation, priming and finish coats specified in this Section are in addition to shop priming and surface treatment specified under other Sections.

B. Paint exposed surfaces whether or not colors are designated in “schedule” except where a surface or material is indicated not to be painted or is to remain natural. Where an item or surface is not mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect and Owner will select from standard colors or finishes available.

1. Painting includes field painting exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.

C. Painting is not required on pre-finished items, finished metal surfaces, concealed surfaces, operating parts, or labels.

1. Labels: Do not paint over Underwriter’s Laboratories, Factor Mutual or other code-required labels, or equipment name, identification, performance rating, or nomenclature plates.

D. The Contractor shall apply damp proofing to the interior face of the perimeter New exterior CMU walls to (where concealed) reduce moisture intrusion during the course of construction, until the final exterior paint system is applied.

E. Non-Galvanized Structural Steel to receive fireproofing as scheduled, shown, or required by the FBC shall be primed by the fabricator but not finished painted.

F. Coating Maintenance Manual: upon conclusion of the project, the Contractor or paint manufacture/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams “Custodian Project Color and Product Information” report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages,

Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.3 GENERAL

A. Furnish all labor, materials, tools, equipment, etc. and services necessary and incidental to the complete fabrication, furnishing and erection of this Section as shown, noted, detailed and reasonably implied on the drawings and in the specifications.

B. Note that warranty requirements are an integral part of the work in this Section and all criteria listed per Article 1.9 of this Section apply.

C. Note that the requirement for prime and finish painting may be included in various Mechanical, Electrical, Plumbing, Fire Protection, and Structural sections of this specification. Coordination is required.

D. The Paint Manufacturer shall also provide their own company paint and coatings specifications accompanied by Product Data and Material Safety Data sheets as part of Article 1.6 Submittals below. It is the intent of these Specifications to establish quality and workmanship detail, and define both generic systems and the extent of the caulking and coatings applications in a general way. It shall then be the responsibility of the Paint Manufacturer to attach and comply with their own company paint and coatings specifications for the precise primers and finish coats and application procedure and methods to ensure this criteria is followed.

E. In the event of discrepancy, the Paint Manufacturer’s specifications shall take precedence over these specifications. Notify the Architect in writing for each and every specific situation as it occurs prior to application of any material.

F. The Paint Manufacturer shall exercise rights of approval in the selection of a competent applicator, which meets their standards for quality workmanship and levels of experience.

G. Although the Paint Manufacturer may not actually manufacture caulking compounds equivalent to these specified herein, they shall be responsible for this phase of work as described in Article1.9 of this Section.

1.4 RELATED SECTIONS

A. Coordinate work of this Section with work of other Sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other Sections, including:

1. Division 5 Section “Metal Fabrications” for shop priming ferrous metal.
2. Division 7 Section “Sprayed Fire-Resistive Materials” and “Caulking and Sealants.”
3. Division 8 Section “Steel Doors and Frames” for shop priming steel doors and frames.

4. Division 9 Section “Exterior Painting” for surface preparation and the application of paint systems on exterior substrates.

1.5 DEFINITIONS

A. “Paint” includes coating system materials, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

1.6 SUBMITTALS

A. Data: Submit product data under provisions of Section 01300 – Shop Drawings, Product Data and Samples to include the Paint Manufacturer's application instructions for all products intended for work in this Section.

B. Painting Schedule: Shall include, but not limited to the following:

1. Pretreatment requirements for each paint system.

2. Spread Rate - gallons per square foot.

3. Wet film thickness in mils.

4. Dry film thickness in mils.

5. Total dry film thickness in mils.

6. Format identical to Article 3.8 PAINT SCHEDULE

C. Samples:

1. Submit manufacturer's standard color chips. Architect and Owner will select colors from manufacturer's color chip brochures. Contractor to prepare color chip samples specified herein before using selected colors. Architect and Owner will make final selection from such color chips and prepare color schedule for Contractor's use.

2. Do not proceed with any painting work until field sample panels of each paint system specified are applied and reviewed by the Architect and Owner.

D. Applicator Certification: Written acceptance of the applying company per Article 1.9 D. of this section.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Section 01600 – Materials and Equipment and Section 01620 – Storage and Protection.

B. Deliver all materials to the job site in original, new and unopened packages and

containers bearing the manufacturer's name and label, and the following information:

1. Product name or title of material,

2. Product description (generic classification or binder type).

3. Manufacturer's name, stock number and date of manufacture.

4. Contents by volume, for major pigment and vehicle constituents,

5. Thinning instructions,

6. Application instructions,

7. Color name and number,

8. No materials other than types specified or approved may be delivered to project site. Unapproved materials shall be removed from project site immediately.

C. Storage and Use of Premises:

1. The applicator shall confine his apparatus, materials storage and operations of his workers to limits indicated by Contractor. All materials used on the job shall be stored in a single place designated by the Contractor. Such storage shall be kept clean and the applicator shall be liable for damage to surrounding areas.

2. Inflammable material and/or fire hazard waste shall be stored, handled and used in an approved manner and shall be removed from the site daily.

D. Store materials not in use in tightly covered containers in a well ventilated area at a minimum ambient temperature of 45 degrees F., or as required by the manufacturer. Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

2. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.8 JOB CONDITIONS

A. Paint only in dry weather when temperature is 50 degrees F or higher. Stop exterior work early to permit paint film to set up before condensation, caused by night temperature drops, occur. Do not begin painting until surfaces are moisture free.

B. Do not varnish or enamel in direct sunlight.

C. Keep paint at room temperature.

D. Sweep dust, dirt and debris away before painting.

E. Execute work in accordance with label directions. Coating applications shall be made in strict conformance to this specification and to the manufacturer's paint instructions on the labels and product data sheets.

F. Paint only dry wood (less than 15 percent moisture). Defer painting until moisture content meets manufacturer's recommendations.

G. Environmental Requirements:

1. Measure moisture content of surfaces using an electronic moisture meter. Do not apply coating unless moisture content of surfaces is below the manufacturer’s recommendations.

2. Paint PH tests shall be taken prior to painting subcontractor beginning his work. PH level to be acceptable to paint manufacturer and subcontractor prior to paint application. Costs of tests to be paid by painting contractor. Provide written documentation of all test results immediately to on-site General Contractor’s superintendent.

3. Strictly follow manufacturer’s recommendations pertaining to environmental conditions.

H. All work shall be accomplished by skilled workmen familiar with and trained to do this type of work and they shall be further qualified to operate or use the equipment and rigging needed to accomplish this work.

I. Materials shall be applied evenly and free of runs, sags, or pinholes.

J. Type and amount prescribed for thinners, solvents, cleaners, etc. to be confirmed by and based on the Paint Manufacturer's written recommendation and approval.

K. All application tools and equipment shall be in good working order and suitable for proper application. All surrounding areas shall be fully protected against damage during each stage of the painting project. All exterior and interior substrates designated not to receive paint coatings shall be kept free of paint residue, e.g. windows, etc.

L. Normal safety signs, necessary lighting and temporary fencing around work areas shall be installed and maintained in accordance with OSHA requirements while work is in progress.

M. Where spray painting has been approved by the Architect, this applicator shall protect all adjacent materials and surfaces by covering entire said areas with approved protective materials. Overspray will not be accepted and, if it occurs,

shall be cleaned up properly and promptly.

N. The applicator shall submit written evidence of insurance coverage of an adequate amount to cover the cost of cleaning and/or repairing vehicles and other property which may be damaged by his work. The applicator shall use all precautions to avoid paint movement and shall notify the Contractor to have vehicles removed from susceptible areas.

O. A progress schedule shall be furnished by the applicator for approval and shall be based on the contract completion date. Applicator shall advise the Contractor of those areas in which work is to be performed 1 week in advance of the work schedule to permit the Contractor to prepare for the work, advise employees, move vehicles, etc.

1.9 QUALITY ASSURANCE

A. Paint Coordination: Provide finish coats which are compatible with prime paints used. Review other sections of these specifications in which prime and/or finish paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information on characteristics of finish material proposed for use, to ensure compatible prime coats are used. Provide barrier coats over incompatible primers or remove and prime as required. Notify the Contractor in writing of any anticipated problems using specified coating systems with substrates primed by others.

B. Examine specification sections of their trades for painting requirements, provisions therein affecting work of this Section.

C. Materials or work left unfinished by requirements of such other specifications but which are required to be painted shall be painted, finished to completion as part of work of this Section.

D. The applicator's qualifications, experience, etc., require the written approval and acceptance by the Paint Manufacturer.

E. Material Quality: Provide the manufacturer’s best quality paint material of the various coating types specified. Paint material containers not displaying manufacturer’s product identification will not be acceptable.

1.10 INSPECTION

A. Applicator must examine the areas and conditions under which painting work is to be applied and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Applicator.

B. Starting of painting work will be construed as the Applicator's acceptance of the surfaces and conditions within any particular area.

C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to the formation of a durable paint film.

D. Dry film thickness will be checked with a properly calibrated Nordson Mikrotest Dry Film Thickness Gauge or by other specifically approved instruments.

E. It will be the Applicator's responsibility to own and use a wet film thickness gauge to check his application thickness as he proceeds.

F. Small sample areas of each phase of work shall be done and checked by the Paint Manufacturer's representative. This will serve upon acceptance by the Architect and Owner as the job standard for remainder of that phase of work. This will also prevent misunderstanding as to interpretation of this specification's standards.

G. The Applicator shall advise the Paint Manufacturer's representative and Architect with enough lead-time prior to beginning each phase of work in order for inspection to not cause a delay in the work of the Applicator.

H. The Paint Manufacturer's representative shall be required to submit written reports to the Architect, Owner, Applicator and Contractor on the progress of satisfactory applications that will include initial job sample applications, and at least bi-weekly reports, that all work is being accomplished in accordance with his approval. These reports shall be a required attachment to each applicable Application for Payment. (Note that they apply to painting work only.) Refer to Section 00950 – Quality Assurance.

I. A final report to the Architect shall notify all parties that the completed work has been done in accordance with the manufacturer's recommendations, and the warranty period commences at the date of substantial completion. Acceptance must be in writing and presented no later than 10 days from receipt of final report, unless a written notice of specification deficiencies is necessary. Under such circumstances, the deficiencies shall then be corrected and new letters of completion and acceptance shall be exchanged.

1.11 SURFACE PREPARATION

A. Each surface shall be cleaned and prepared as specified in accordance with the Paint Manufacturer's surface preparation recommendations and requirements. The applicator is responsible for the finish of his work. Should any surface be found unsuitable to produce a proper paint or sealant finish, the Contractor shall be notified in writing and no material shall be applied until the unsuitable surfaces have been made satisfactory.

B. All interior surfaces to be painted shall be cleaned to remove dirt, mildew, chalked paint and any foreign materials deterrent to the new finish and allowed to completely dry before painting.

C. Cracking that cannot be bridged by the paint film shall be brought to the attention of the Contractor who shall then direct repairs by the proper party.

D. Unprimed metals shall be mechanically hand tooled to bright metal and primed with a universal rust inhibitive primer as recommended by the Paint Manufacturer.

E. Painted wood surfaces shall be carefully inspected for evidence of deterioration or surface imperfections. Sandpaper any hard, glossy surface to ensure proper adhesion. Fill nail holes, imperfections and cracks with putty. Edges, corners, and raised grain shall be eased by sanding. Each coat required shall be sanded except the last. For surfaces scheduled to receive a prime coat only, sand, and re-prime after initial coat as required to conceal any defects due to insufficient sealing. Wood trim that is scheduled to be painted shall be spray painted; brush painting will not be acceptable. Wood floors shall receive (4) four coats of sealer.

F. Any loose and scaling shop painted item shall be cleaned by hand wire brushing or other suitable power tool cleaning as per SSPC-SP2 “Hand Tool Cleaning” or SSPC-SP3 “Power Tool Cleaning” standards then spot primed per the paint manufacturer's instructions.

G. Galvanized Metal Surfaces: Galvanized metal surfaces shall be pretreated and wiped with a biodegradable cleaner to remove any dirt, oil or grease. The galvanized surfaces shall be prepared and primed prior to application of the finish coat(s) of paint as recommended by the paint manufacturer.

1.12 WARRANTY

A. Work performed to Specifications will be warranted as follows:

1. The Paint Manufacturer warrants to the building Owner and to the Contractor that for five (5) years after the date of substantial completion for the application of all coatings scheduled in Article 3.8 "Painting Schedule", Section 09912 – Interior Painting of the project specifications and installed by the Painting Contractor, these coatings will be free from defects in manufacture and will conform to manufacturer's specifications for these products. In addition, if the Contractor applies each coating in accordance with the manufacturer's specification for application as noted below, the Paint Manufacturer warrants to the building Owner and to the Contractor that the product so applied will perform satisfactorily for three (3) years under installed conditions and will provide normal and customary protection of the substrate and will not crack, peel or blister for five (5) years under installed conditions. The warranty applies only to above-grade coated surfaces and does not apply to conditions caused by structural defect, building settlement or building movement as determined and certified by the project Structural Engineer, vandalism, negligence or other causes beyond the Paint Manufacturer's control.

2. The Paint Manufacturer representative will be given full and complete access to the job site during all stages of the construction. The paint manufacturer's representative will:

a. Inspect all surfaces prior to paint application.

b. Provide detailed written specifications for surface preparation, sealing, curing time, temperature, coatings specifications, or special application procedures for each scheduled coating.
c. Provide all reports, testing, monitoring, checking, etc. as listed in the project specification Section 09912 – Interior Painting for this project.

4. Any claim made under this warranty must be in writing within thirty (30) days of the alleged product failure. "The paint manufacturer makes no other warranties, express or implied," including without extending or limiting the duration provided by law of any implied warranty or warranty of fitness for purpose or use." In the event that the installed product fails to conform to the above warranties, written notification will be forwarded to the Paint Manufacturer as noted above.

Within thirty (30) days, a response detailing the Paint Manufacturer's analysis and recommendations including the Contractor's schedule for required remedial actions will be provided for coordination with the Architect and Owner. Any recoated areas will be warranted only for the remainder of the original warranty period, which shall not be extended as a result of the supply of replacement materials or labor.

Provide a signature element that includes the name and title of the signatories for the Paint Manufacturer, the building Owner, the Contractor, the date of substantial completion/warranty effective date, and the project name and address.

By issuing this warranty, the Paint Manufacturer and this contractor confirm that said warranty shall include and cover the Paint Manufacturer's costs relating to corrective or replacement paint, coatings or sealant work needed to re-establish the integrity of the paint for this project. This includes all labor and materials. This warranty shall apply to excessive cracking, chipping, peeling, or disbonding of the paint from any substrate. It is understood that minor fading is expected; however, any catastrophic discoloration or loss of color shall also be covered by said warranty.

1.13 MOCK-UPS

A. Prepare a field sample application of each scheduled paint color (mock-up) at locations approved by the Architect. Each mock-up shall cover approximately 4 square feet of area (2'-0" by 2'-0"). Apply mock-ups in quantities of paint colors selected and furnished by the Owner or Architect. Upon approval of preliminary colors by the Owner and the Architect, furnish final mock-ups.

B. At finished construction locations as directed and approved by the Architect, provide final painting field mock-ups to cover approximately 100 square feet of area (10'-0" by 10'-0") using final colors per Article 1.10 above. Mock-ups are to represent conditions of finished work including one typical horizontal to vertical interface for both interior and exterior conditions as well as typical wall surfaces.

C. Mock-ups approved by the Owner shall constitute standard of acceptance for remaining work. Do not disturb or alter mock-ups during remaining construction.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Basis of Design Product: Subject to compliance with requirements, provide Sherwin-Williams Company (The) or comparable product by one of the following:

1. PPG Paints.
2. Porter Paints
3. Devoe/ICI Paints

B. Manufacturers: Subject to compliance with the project requirements and specifications, provide products specified below or an Architect approved equal. The burden of proof of equality is on the proposer.

C. Substitutions: Where a selected manufacturer or product has been specified, and equal or superior product or change in manufacturer may be accepted only upon review and written acceptance by the Architect. All such proposed changes or substitutions shall be submitted to the Architect with appropriate manufacturer's specifications and literature, environmental compliance assurance and independent laboratory testing data, and side by side comparative for each product type. The Architect's decision whether a product or manufacturer is equal or superior to the one specified shall be final. Refer to Division 01 for additional product substitution requirements.

D. All materials used in this paint contract shall be as manufactured and delivered on the job in original, sealed containers.

E. The paints herein specified are known to be suitable and will be enforced as the required standards of quality of this work.

F. Extra Materials: Provide 10-gallons of each selected color for maintenance stock to the owner.

G. Provide a final typed painting schedule to be included in Section 01700 – Project Closeout with maintenance manuals.

H. Damp proofing to be applied to the interior face of the perimeter New exterior CMU walls (where concealed) walls are to be "Dry-Lock", or approved equal.

2.2 COLORS

A. Colors of the interior of the project shall be as selected by the Owner and the Architect. Color schedules shall be furnished to the Applicator before application of prime coats. Prime coats will be tinted to be a slightly different shade compared to

the succeeding coat. Refer to the Drawings for the paint colors and location.

B. Colors of the storage and mechanical rooms will be a single color; antique white or similar color based on the Airport standard to be approved by the Owner and Architect.

PART 3 EXECUTION

3.1 INSPECTION

A. Prior to installation of the work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence. Painting contractor shall notify the General Contractor in writing if repair or replacement of any damaged or otherwise unacceptable substrates exist or is necessary. Verify that painting may be completed in strict accordance with the project requirements/specifications and with the manufacturer's recommendations. Do not proceed until all such discrepancies have been fully resolved.

B. All work will be inspected and approved in writing, on a regular basis by the paint manufacturer's representative. A schedule of inspections required of the manufacturer will be reviewed and coordinated with the General Contractor prior to the commencement of the painting work.

1. The minimum inspection requirements prior to start of each area or drop are:

   a. Verify that surfaces are ready to receive work.

   b. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

   c. Verify that substrate moisture content and PH do not exceed recommended conditions as predetermined by all parties involved.

   d. Examine all caulk joints for use of appropriate sealant, adequate application and adequate adhesion.

2. Minimum testing during application:

   a. Moisture.

   b. PH test.

   c. Wet mil test of base application.

   d. Dry mil test of base application.

e. Wet mil test of finish coat(s).

3. Minimum upon completion:

a. Dry mil test of completed application.

b. Summary report of all testing and copies of all field testing reports.

3.2 SURFACE PREPARATION

A. General: Clean and prepare surfaces to be painted in accordance with manufacturer's printed instructions and current recommendations for each particular substrate condition and as specified.

1. Notify the Architect and General Contractor in writing of problems anticipated using specified finish coat material with substrates primed by others.

2. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and items in place that are not to be painted, or provide suitable protection prior to surface preparation and painting. Remove items if necessary for complete painting of the items and adjacent surfaces. Following completion of painting operations in each space or area, reinstall items removed using workmen skilled in the trades involved.

3. Clean surfaces before applying paint or surface treatment. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

B. Cementitious Surfaces: Prepare concrete, concrete masonry, and similar surfaces to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. Use abrasive blast cleaning if recommended by paint manufacturer.

1. Determine alkalinity and moisture content of surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

C. Wood: Clean surfaces of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper as required. Sand surfaces exposed to view smooth, and dust off.

1. Scrape and clean, small, dry, seasoned knots and apply a thick coat of white shellac or other recommended knot sealer, before application of primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.

2. Prime, stain, or seal wood to be painted immediately upon delivery. Prime edges, end, faces, undersides, and backsides of wood.

3. When transparent finish is required, use spar varnish for back priming.

4. Seal tops, bottoms, and cutouts of unprimed wood doors with heavy coat of varnish or sealer immediately upon delivery.

5. Wood floors to receive (4) four coats of sealer; refer to specification Section - Wood Flooring for field finishing requirements. Initial coats shall be thinned for maximum penetration of sealer.

D. Ferrous Metals: Clean non-galvanized ferrous metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council (SSPC).

1. Touch-up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.

E. Galvanized Surfaces: Clean galvanized surfaces with non-petroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pre-treatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

E. Doors: Door bottoms and tops shall be primed and painted prior to hanging the doors. The Contractor shall coordinate the timing of this work to ensure that this process is completed prior to hanging the doors within the frame.

3.3 GENERAL

A. Protect work of other trades, whether to be painted or not, from damage by painting work. Mask hardware as required to protect, i.e. brass door butts, etc.

B. Provide “Wet Paint” signs where appropriate to protect uncured finishes.

C. Spray applications, when used, shall produce the equivalent hiding quality per coat as brush or roller-applied coats. Do not double back with spray equipment for the purpose of building up film thickness of two coats in one pass. All spray applied paint shall be “back rolled” to assure proper coverage and uniformity.

D. The first and second coats of paint will be of slightly different shades for inspection purposes.

E. Viscosity and thickness tests may be taken by the General Contractor or manufacturer. Cost of tests will be borne by the subcontractor if found to be below specification requirements.

F. Painter to protect floors from over-spray and to clean if necessary.

G. All weather stripping around doors, windows and other openings shall not be painted. Special care shall be taken to properly “mask” and protect these components from all painting operations.

H. All finished drywall surfaces shall be coated with a primer/sealer to highlight any imperfection in the drywall surface, which shall be repaired before the final application of paint is applied.

I. Subcontractor shall provide adequate painting protection for all of the trades work throughout the painting operations. Once surrounding services have been painted and protection is no longer needed, temporary protection shall be removed.

J. Clean all surfaces of foreign matter prior to any paint application.

3.4 MATERIALS PREPARATION

A. Mix and prepare paint in accordance with manufacturer’s directions. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.

B. Use factory mixed colors, shade, and tints. Job mixing permitted only with specific written approval of the Paint Manufacturer's representative and the Architect.

C. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing, and application of paint in a clean condition, free of foreign materials and residue.

D. Stir materials before application to produce a mixture of uniform density, and stir as required during the application of the materials. Do not stir surface film into the material. Remove the film and if necessary, strain the material before using.

E. Use only thinners approved by manufacturer, and only within recommended limits.

3.5 APPLICATION

A. Apply paint of consistency recommended by and in accordance with the paint manufacturer's data sheets. Use tools and techniques best suited for the substrate and type of material being applied per manufacturer's data sheets.

B. Paint interior surfaces of ducts where visible through registers or grilles, with a flat, non-specular black paint as per paint schedule.

C. Finish exterior and interior doors on tops, bottoms and side edges the same as the exterior faces, unless otherwise indicated.

D. Exposed pipes and ductwork on or near walls or ceilings that are to be painted shall be painted, unless otherwise indicated.

E. Orange peel/rough finish on metal or wood surfaces shall not be permitted.

F. Provide primer coats for all walls and trim to receive a faux finish. Faux finishes are not included in this contract.

G. The number of coats and film thickness required is the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce a smooth, even surface, in accordance with the manufacturer's directions.

H. Apply additional coats when undercoats show through final coat of paint, until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry-film-thickness equivalent to that of flat surfaces.

I. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, grilles and similar components are in place. Extend coatings in these areas to maintain system integrity and provide desired protection.

J. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.

K. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, nonspecular black paint.

L. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.

M. The back of hollow metal-exterior door frames shall be finished with a mastic primer, from the bottom of the door to 18 inches above the finish floor.

N. Omit primer on metal surfaces that have been shop-primed and touch up painted.

O. Sand lightly between each succeeding enamel or varnish coat.

P. Scheduling Painting: Apply first-coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable, and before subsequent surface deterioration. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure and where application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

Q. Minimum Coating Thickness: Apply materials at the manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by the manufacturer.

R. Block Fillers: Apply block fillers to concrete masonry unit at a rate to ensure complete coverage with pores filled.

S. Prime Coats: Before application of finish coats, apply a prime coat of material as recommended by the manufacturer to material required to be painted or finished, and has not been prime coated by others.

1. Recoat primed and sealed substrates where evidence of suction spots or unsealed areas in the first coat appears, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

T. Brush Application: Brush-out and work brush coats into surfaces in an even film. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Draw neat glass lines and color breaks.

1. Apply primers and first coats by brush unless manufacturer's instructions permit use of mechanical applicators.

U. Mechanical Applications: Use mechanical methods for paint application when permitted by manufacturer's recommendation, governing ordinances, and trade union regulations.

1. Wherever spray application is used, apply coat to provide the equivalent hiding of brush-applied coats. Do not double-back with spray equipment building-up film thickness of two coats in one pass unless recommended by the manufacturer.

V. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirement.

3.6 FIELD QUALITY CONTROL

A. The Owner reserves the right to engage the services of an independent testing laboratory to sample and test paint material being used. Samples of material delivered to the project will be taken, identified, sealed, and certified in the presence of the Contractor.

1. The testing laboratory will perform appropriate tests as required by the Owner.

2. If tests show material being used does not comply with specified requirements, the Contractor may be directed to stop painting pay for testing, repaint surfaces coated with reject paint, remove rejected paint from previously painted surfaces if, upon repainting with the specified paint, the two coatings are non-compatible.

3.7 CLEAN UP AND PROTECTION

A. During the progress of the work, remove from the site all discarded paint materials, rubbish, cans, and rags at the end of each workday.

B. Remove splashed, dropped, spattered, and spilled paint from hardware, fixtures, glass, and building parts.

C. Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing, or replacing, and repainting as acceptable to the Architect.

D. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.

E. At the completion of work of other trades, and after notification in writing to the Contractor, touch-up and restore all damaged or defaced painted surfaces. A touch-up allowance will be included in final contract.

3.8 PAINT SCHEDULE

3.8.1 COLOR SCHEDULE

Interior Building Colors (Color numbers based on Sherwin Williams Paints) Refer to schedules for color location; multiple color selections will be used for interior building elements.

A. IP-1 Eggshell Finish – Front Porch SW 7651 (Accent color)
B. IP-2 Eggshell High Performance Finish- Snow Bound SW 7004 (based color)
C. IP-3 Epoxy Eggshell Finish– Egret White SW 7570 (Corridor) (Architect to confirm)
D. IP-4 Eggshell Finish– Sensible Hue SW 6198 (Toilet walls) (Architect to confirm)
E. IP-5 Flat Finish– High Reflective White SW 7757 (Ceiling rooms)
F. IP-6 Semi-gloss High Performance Finish– (Hollow metal door frames)

3.8.2 PAINT SYSTEMS AND COATING SCHEDULE

Refer to the Drawings for the materials for the application of the various interior paint finish types (letter designation) scheduled below. Provide finish scheduled below if not indicated on the Drawings or Finish Schedule on the Drawings.

A. THE SHERWIN WILLIAMS COMPANY: Attached are the Material Supplier's detailed prime and finish coats specifications. This defines primer and finish coat names, product number designations, and thickness. Because this supplier is providing a warranty, strict adherence to product Data Sheet and label instructions shall be followed. The following schedule shall not be considered as entirely inclusive, but construed as a general guide for complete painting of buildings, structures, etc., including, but not limited to, storage spaces, recesses, returns, reveals, soffits, haunches, forming part of a particular surface, room or space, pipes, conduits, duct work, panels, mechanical equipment, etc.

FINISH TYPE	Wet Film Thickness MILS	Dry Film Thickness MILS	Spread Rate SF/Gal.
A1. Interior Concrete - Prime Only			

1st coat	Sherwin Williams Loxon Concrete & Masonry Primer, A24W300	8.0	3.2	200

A2. Interior Concrete - Flat Finish

1st coat	Sherwin Williams Loxon Concrete & Masonry Primer, A24W300	8.0	3.2	200
2nd coat	Sherwin Williams Pro/Mar 700 Latex Flat B30W7700	4.0	1.1	300
	TOTAL DRY MILS		1.4	

A3. Interior Concrete - Semi Gloss Finish

1st coat	Sherwin Williams Loxon Concrete & Masonry Primer, A24W300	8.0	3.2	200
2nd coat	Sherwin Williams Pro/Mar 700 Latex Semi-gloss B31W7700	4.0	1.3	300
	TOTAL DRY MILS		4.5	

A4. Concrete Floor Stain

1st coat	H&C Concrete Sealer Solid Color Solvent Based thinned 25%	175
2nd coat	H&C Concrete Sealer Solid Color Solvent Based full strength	200

A5. Concrete Floor Sealer - Clear

1st coat	Concrete Sealer H & C Concrete & Masonry Waterproofing Sealer

B1. Interior (Face) Concrete Block - Prime Only / Exterior Walls (Dry Lock-Alternate)

1st coat	Sherwin Williams Water Blocking Primer Finish Interior Latex, B72W08010	8.0	3.7	75

B2. Interior Concrete Block - Flat Finish

1st coat	Sherwin Williams Prep Rite Block Filler B25W25	16.0	8.0	87-108
2nd coat	Sherwin Williams Pro/Mar 700 Latex Flat B30W7700	4.0	1.1	300

	TOTAL DRY MILS		9.1	

B3. Interior Concrete Block - Semi Gloss Finish

1st coat	Sherwin Williams Prep Rite Block Filler B25W25	16.0	8.0	87-108
2nd coat	Sherwin Williams Pro/Mar 700 Latex Semi-gloss B31W7700	4.0	1.3	300
	TOTAL DRY MILS		9.3	

C1. Interior Plaster Veneer - Prime Only

1st coat	Sherwin Williams Loxon Concrete & Masonry Primer, A24W300	8.0	3.2	200

C2. Interior Plaster Veneer - Flat Finish

1st coat	Sherwin Williams Loxon Concrete & Masonry Primer, A24W300	8.0	3.2	200
2nd coat	Sherwin Williams Pro/Mar 700 Latex Flat B30W7700	4.5	1.4	300
3rd coat	Sherwin Williams Pro/Mar 700 Latex Flat B30W7700	4.0	1.1	300
	TOTAL DRY MILS		5.7	

C3. Interior Plaster Veneer - Eggshell Finish

1st coat	Sherwin Williams Loxon Concrete & Masonry Primer, A24W300	8.0	3.2	200
2nd coat	Sherwin Williams Pro/Mar 400 Zero VOC Int. Latex Eg-Shel, B20-4600	4.0	1.3	300
3rd coat	Sherwin Williams Pro/Mar 400 Zero VOC Int. Latex Eg-Shel, B20-4600	4.0	1.3	300
	TOTAL DRY MILS		6.8	

C4. Interior Plaster Veneer – Semi-Gloss Finish

1st coat	Sherwin Williams Loxon Concrete & Masonry Primer, A24W300	8.0	3.2	200

2nd coat	Sherwin Williams Pro/Mar 700 Latex Semi Gloss B30W7700	4.5	1.3	300
3rd coat	Sherwin Williams Pro/Mar 700 Latex Semi-Gloss B30W7700	4.5	1.3	300
	TOTAL DRY MILS		6.8	

D1. Interior Gypsum Board - Prime Only

1st coat	Sherwin Williams ProMar 400 Zero VOC Int. Latex Primer, B28W04600	4.0	1.1	300

D2. Interior Gypsum Board - Flat Finish

1st coat	Sherwin Williams ProMar 400 Zero VOC Int. Latex Primer, B28W04600	4.0	1.1	300
2nd coat	Sherwin Williams Pro/Mar 700 Latex B28W7700	4.0	1.1	300
3rd coat	Sherwin Williams Pro/Mar 700 Latex B28W7700	4.0	1.1	300
	TOTAL DRY MILS		3.3	

D3. Interior Gypsum Board - Eggshell Finish

1st coat	Sherwin Williams ProMar 400 Zero VOC Int. Latex Primer, B28W04600 Build Primer B28W601	4.0	1.1	300
2nd coat	Sherwin Williams Pro/Mar 400 Zero VOC Int. Latex Eg-Shel, B20-4600	4.0	1.3	300
3rd coat	Sherwin Williams Pro/Mar 400 Zero VOC Int. Latex Eg-Shel, B20-4600	4.0	1.3	300
	TOTAL DRY MILS		3.7	

D4. Interior Gypsum Walls to Receive Wallcovering

1st coat Multi-Purpose Int/Ext Latex Primer/Sealer, B51-450 Series

E1. Interior Metal Doors and Frames - Prime Only

1st coat	Sherwin Williams Kem Kromik Universal Metal Primer B50 Series	6.0	3.0	200

E2. Interior Metal Doors and Frames - Factory Primed

1st coat	Sherwin Williams Kem Kromik Universal Metal Primer B50 Series (spot prime)	6.0	3.0	200
2nd coat	Sherwin Williams Pro/Mar 200 Alkyd Semi-Gloss B34-200	4.0	1.7	300
3rd coat	Sherwin Williams Pro/Mar 200 Alkyd Semi-Gloss B34-200	4.0	1.7	300
	TOTAL DRY MILS		6.4	

E3. Interior Metal Handrails

1st coat	Sherwin Williams Kem Kromik Universal Metal Primer B50 Series (spot prime)	6.0	3.0	200
2nd coat	Sherwin Williams Industrial Enamel B54 Series	5.0	2.0	300
3rd coat	Sherwin Williams Industrial Enamel B54 Series	5.0	2.0	300
	TOTAL DRY MILS		7.0	

E4. Mechanical and Structural Members Exposed to view

1st coat	Sherwin Williams Macropoxy 646 Fast Cure Epoxy, B58-600 Series	7.0	5.0	136-227
2nd coat	Sherwin Williams Hi-Solids Polyurethane, B65-300 Series	4.0--8.0	3.0-5.0	215-250
	TOTAL DRY MILS		8.0-10.0	

E5. Structural Steel

1st coat	Sherwin Williams Kem Kromik Universal Primer, B50 Series	6.0	3.0	274
2nd coat	Sherwin Williams Pro Industrial High Performance Acrylic, B66-600 Series	6.0	2.5	200
	TOTAL DRY MILS		5.5	

E6. Structural Steel Touch-Up

1st coat	Sherwin Williams Kem Kromik Universal Metal Primer B50 Series	6.0	3.0	300

E7. Interior Ferrous Metal / Exposed to view Fire Sprinkler Piping

(Refer to galvanized metal surface preparation if sprinkler piping is galvanized.)

1st & 2nd coats Each Coat	Sherwin Williams Kem Kromik Universal Metal Primer B50 Series	6.0	3.0	200
3rd coat	Sherwin Williams Pro Industrial High Performance Acrylic, B66-600 Series	6.0	2.5	200
	TOTAL DRY MILS		8.5	

E8. Unfinished Ferrous Metals

1st coat	Sherwin Williams Kem Kromik Universal Metal Primer B50 Series	6.0	3.0	200
2nd coat	Sherwin Williams Pro Industrial High Performance Acrylic, B66-600 Series	6.0	2.5	200
	TOTAL DRY MILS		5.5	

E9. Interior Exposed Mechanical Equipment - Shop Primed

Ferrous Metal Pretreatment: Remove all rust and mill scale prior to coating.

1st coat	Sherwin Williams Kem Kromik Universal Metal Primer B50 Series	6.0	3.0	200
2nd coat	Sherwin Williams Kem Kromik Universal Metal Primer B50 Series	6.0	3.0	200
3rd coat	Sherwin Williams Pro Industrial High Performance Acrylic, B66-600 Series	6.0	2.5	200
	TOTAL DRY MILS		8.5	

E10. Interior Surfaces of Ducts Where Visible Through Registers or Grilles

1st coat	Sherwin Williams Pro Industrial Multi-Surface Acrylic, B66-560 Series Black	3.75	1.5	

E11. Galvanized Metal

(If Galvanized Metal is Surface Treated, must Solvent Clean with Biodegradable Cleaner)

1st coat	Sherwin Williams Pro Industrial Pro-Cryl Universal Primer, B66-310 Series	6.0	3.0	264

2nd coat	Sherwin Williams Pro Industrial High Performance Acrylic, B66-600 Series	6.0	2.5		

E12. Galvanized Surface touch-up

1st coat	Sherwin Williams Pro Industrial Pro-Cryl Universal Primer, B66-310 Series	6.0	3.0	200

E13. Copper Piping Exposed to view

1st coat	Sherwin Williams Multi-Purpose Int/Ext Latex Primer/Sealer, B51-450 Series	4.0	1.4	200
2nd coat	Sherwin Williams Pro Industrial High Performance Acrylic, B66-650 Series	6.0	2.5	200
	TOTAL DRY MILS		3.9	

E14. Exposed (Non-copper) Piping (Except Black Mastic Drain Pipes)

1st coat	Sherwin Williams Macropoxy 646 Fast Cure Epoxy, B58-600 Series	7.0	5.0	136-227
2nd coat	Sherwin Williams Macropoxy 646 Fast Cure Epoxy, B58-600 Series 646 Series	7.0	5.0	136-227
3rd coat	Pro Industrial High Performance Acrylic, B66-660 Series	6.0	2.5	200
	TOTAL DRY MILS		12.5	

E15. Unprimed Ferrous Metal and Overhead Grille Brackets

Pretreatment: Clean in accordance with Paragraph 1.11D.

1st coat	Sherwin Williams Kem Kromik Universal Metal Primer B50 Series	6.0	3.0	200
2nd coat	Sherwin Williams Industrial Enamel, B54 Series, Gloss Enamel Gloss	5.0	2.0	300

F1. Interior Wood Doors, Frames, and Base - Prime Only
Pretreatment: Fill all holes wit Dap Fast & Final Spackle. Caulk all open joints with Sherwin Williams C1050 Acrylic Silicone Latex Caulk.

1st Coat	Sherwin Williams Premium Wall & Wood Primer Int. Latex Primer, B28W8111	4.0	1.8	300

F2. Interior Wood Base and Running Trim Back Primer

1st coat	Sherwin Williams Premium Wall & Wood Primer Int. Latex Primer, B28W8111	4.0	1.8	300

F3. Interior Wood Doors, Frames, Trim and Base – Semi-Gloss

Caulk and Putty Pretreatment: Fill all holes with Dap Fast and Final Spackle. Caulk all open joints with Sherwin Williams C1050 Acrylic Silicone Latex Caulk.

1st coat	Sherwin Williams Premium Wall & Wood Primer Int. Latex Primer, B28W8111	4.0	1.8	300
2nd coat	Sherwin Williams Pro/Mar 200 Alkyd Semi-Gloss B34W200	4.0	1.7	300
3rd coat	Sherwin Williams Pro/Mar 200 Alkyd Semi-Gloss B34W200	4.0	1.7	300
	TOTAL DRY MILS		5.2	

F4. Interior Wood Stain and Sealer

1st coat	Sherwin Williams Wood Classics Interior Oil Stain, A49-200 Series	3.0-3.5	0	450-550
2nd coat	Sherwin Williams Wood Classics Polyurethane Varnish, Gloss A67V1	4.0	1.7	350-400
3rd coat	Sherwin Williams Wood Classics Polyurethane Varnish, Satin A67 Series	4.0	1.7	350-400
	TOTAL DRY MILS		3.4	

* Wood floors to receive (4) four coats of sealer; refer to Section 09640 for coating requirements. Initial coats to be thinned.

F5. Terminal and Telephone Boards

1st coat	Flame Control 20-20	8.5	4.5	190
2nd coat	Flame Control 20-20	8.5	4.5	190
	TOTAL DRY MILS		9.0	

G1. Interior PVC Piping Exposed to view

1st coat	Multi-Purpose Int/Ext Latex Primer/Sealer, B51-450 Series	4.0	1.4	200

2nd coat	Sherwin Williams PM 400 Zero VOC Int. Flat, B30-4600 Series			
		4.0	1.2	300
	TOTAL DRY MILS		2.6	

S2. Interior Sealant

C-950 Acrylic Sealant

END OF SHERWIN WILLIAMS COMPANY PAINT SYSTEMS SCHEDULE

END OF SECTION 09912

SECTION 09960 – HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Provisions and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surface preparation and painting of exterior metal tube beams and beam support columns and exterior metal components.

B. Related Sections:

1. Division 5 Section “Metal Fabrications.”
2. Division 9 Section “Exterior Painting” for surface preparations, painting, and finishing of all other exposed exterior items and surfaces.

1.3 REFERENCE SPECIFICATIONS AND STANDARDS

A. Without limiting the general aspects of other requirements of these specifications, all surface preparation, coating and painting of surfaces shall conform to the applicable requirements of the Steel Structures Painting Council, NACE, ICRI and the manufacturer's printed instructions.

B. The Architect’s decision shall be final as the interpretation and/or conflict between any of the referenced specifications and standards contained herein.

1.4 APPLICATOR CERTIFICATIONS

A. The Applicator shall have five years practical experience and successful history in the application of specified products in similar projects. This requirement shall be substantiated by furnishing a list of references and job completions.

B. Applicator must successfully demonstrate to the product manufacturer the ability to apply the material correctly and within the confines of the specifications. The Applicator must provide a letter from the manfacture stating their acceptance of the Applicator for this project to apply these products.

C. The Applicator shall possess the applicable license to perform the work as herein described and as specified by local, state and federal laws.

1.5 QUALITY ASSURANCE

A. General: Quality assurance procedures and practices shall be utilized to monitor all phases of surface preparation, application, and inspection throughout the duration of the project. Procedures or practices not specifically defined herein may be utilized provided they meet recognized and accepted professional standards and are approved by the Architect.

B. Surface Preparation: Surface preparation will be based upon comparison with: "Pictorial Surface Preparation Standards for Painting Steel Surfaces", SSPC-Vis-1 and ASTM Designation D2200; "Standard Methods of Evaluating Degree of Rusting on Painted Steel Surfaces" SSPC-Vis-2 and ASTM Designation D610; and ICRI CSP Surface Profile Chips.

C. Application: No coating or paint shall be applied: When the surrounding air temperature or the temperature of the surface to be coated is below the minimum required temperature for the specified product; to wet or damp surfaces or in fog or mist; when the temperature is less than 5 degrees F. above the dewpoint; when the air temperature is expected to drop below 40 degrees F. within six hours after application of coating. Dewpoint shall be measured by use of an instrument such as a Sling Psychrometer in conjunction with U.S. Department of Commerce Weather Bureau Psychrometric Tables. If above conditions are prevalent, coating or painting shall be delayed or postponed until conditions are favorable. The day's coating or painting shall be completed in time to permit the film sufficient drying time prior to damage by atmospheric conditions.

D. Thickness and Holiday Checking: Thickness of coatings and paint shall be checked with a non-destructive, magnetic type thickness gauge. The integrity of coated interior surfaces shall be tested with an approved inspection device. Non-destructive holiday detectors shall not exceed the voltage recommended by the manufacturer of the coating system. For thicknesses between 10 and 20 mils (250 microns and 500 microns), a non-sudsing type wetting agent, such as Kodak Photo-Flo, may be added to the water prior to wetting the detector sponge. All pinholes shall be marked, repaired in accordance with the manufacturer's printed recommendations, and retested. No pinholes or other irregularities will be permitted in the final coating.

E. Inspection Devices: The Contractor shall furnish, until final acceptance of coating and painting, inspection devices in good working condition for detection of holidays and measurement of dry-film thickness of coating and paint. The Contractor shall also furnish U.S. Department of Commerce; National Bureau of Standard certified thickness calibration plates to test accuracy of dry film thickness gauges and certified instrumentation to test accuracy of holiday detectors.

F. All necessary testing equipment shall be made available for the Architect’s use at all times until final acceptance of application. Holiday detection devices shall be operated in the presence of the Architect.

1. 6 SAFETY AND HEALTH REQUIREMENTS

A. General: In accordance with requirements set forth by regulatory agencies applicable to the construction industry and manufacturer's printed instructions and appropriate technical bulletins and manuals, the Contractor shall provide and require use of

personnel protective lifesaving equipment for persons working on or about the project site.

B. Head and Face Protection and Respiratory Devices: Equipment shall include protective helmets, which shall be worn by all persons while in the vicinity of the work. In addition, workers engaged in or near the work during sandblasting shall wear eye and face protection devices and air purifying halfmask or mouthpiece respirators with appropriate filters. Barrier creams shall be used on any exposed areas of skin.

C. Ventilation: Where ventilation is used to control hazardous exposure, all equipment shall be explosion-proof. Ventilation shall reduce the concentration of air contaminant to the degree a hazard does not exist. Air circulation and exhausting of solvent vapors shall be continued until coatings have fully cured.

D. Sound Levels: Whenever the occupational noise exposure exceeds maximum allowable sound levels, the Contractor shall provide and require the use of approved ear protective devices.

E. Illumination: Adequate illumination shall be provided while work is in progress, including explosion-proof lights and electrical equipment. Whenever required by the Architect, the Contractor shall provide additional illumination and necessary supports to cover all areas to be inspected. The Architect shall determine the level of illumination for inspection purposes.

F. Confined Space: When applicable it is mandatory that all work be performed in compliance with OSHA'S rules and regulations for working in confined space. Atmospheres within confined spaces as defined by the Occupational Safety and Health Administration are classified as being either a Class A, Class B or Class C environment.

PART 2 - PRODUCTS

2.1 GENERAL

A. Materials specified are those that have been evaluated for the specific service. Products of the Tnemec Co. are listed to establish a standard of quality. Equivalent materials of other manufacturers may be substituted on written approval of the Architect.

Basis of Design: Tnemec Company, Incorporated –Florida Protective Coatings. Contact is Mr. Chad Holmes (727) 201-6706 or cholmes@tnemec.com.

Requests for substitution shall include manufacturer's literature for each product giving the name' product number, generic type, descriptive information, solids by volume, recommended dry film thickness, cost savings and certified test reports showing results to equal the performance criteria of the products specified herein. No request for substitution shall be considered that will decrease film thickness, the number of coats or offer a change in the generic type of coatings specified. In addition, a list of five similar projects shall be submitted in which each product has been used and rendered satisfactory service.

Requests for product substitution shall be made in accordance with Division 01.

Manufacturer's color charts shall be submitted to the Architect and Owner at least 30 days prior to paint application. Contractor and painting contractor shall coordinate work so as to allow sufficient time (five to ten days) for paint to be delivered to the jobsite.

B. All materials shall be brought to the jobsite in original, sealed containers. They shall not be used until the Architect has inspected contents and obtained data from information on containers or labels. Materials exceeding storage life recommended by the manufacturer shall be rejected.

C. All coatings and paints shall be stored in enclosed structures to protect them from weather and excessive heat or cold. Flammable coatings or paint must be stored to conform to City, County, State and Federal safety codes for flammable coating or paint materials. At all times, coating and paints shall be protected from freezing.

D. A NACE certified technical representative from the paint manufacturer shall visit the job site to support the Contractor's personnel, the Owner and/or the Architect as needed and/or requested. Visits shall be made as needed to help with hold points for the Owner or Architect. Additional visit shall be made as needed and/or requested by Owner, Architect or Contractor. 48 hours' notice is required by the Contractor for each hold point inspection.

E. All parties, to include the owner or Owner's designated representative, Architect, Contractor, installer, any subs and the product manufacture, shall meet prior to any work is started to review the spec and discuss job specific expectations, need and requirements

F. Coating Systems:

Exterior Exposed Surfaces

Structural Steel and all Misc. Metal:

Surface Preparation: SSPC-SP6/NACE 3 Commercial Blast Cleaning. The surface shall be clean and dry.

1st Coat: Tnemec Series 90-97 Tneme-Zinc @ 2.5 – 3.5 dry mils.
2nd Coat: Tnemec Series N69 Hi-Build Epoxoline II applied at 4.0 – 6.0 dry mils.
3rd Coat: Tnemec Series 740 UVX applied at 3.0 – 5.0 dry mils.

Galvanized Metal:

Surface Preparation: SSPC-SP1 Solvent Cleaning. Remove all soluble and insoluble contaminants and corrosion. Remove any storage stains per Section 6.2 of ASTM D6386. Sweep (Abrasive) Blasting per ASTM D 6386 to achieve a uniform anchor profile (1.0 - 2.0 mils).

1st Coat: Tnemec Series N69 Hi-Build Epoxoline II applied at 2.0 – 6.0 dry mils.

2nd Coat: Tnemec Series 740 UVX applied at 3.0 – 5.0 dry mils.

PART 3 - EXECUTION

3.1 GENERAL

A. All surface preparation, coating and painting shall conform to applicable standards of the Steel Structures Painting Council, NACE, ICRI and the manufacturer's printed instructions. Material applied prior to approval of the surface by the Architect shall be removed and reapplied to the satisfaction of the Architect at the expense of the Contractor.

B. All work shall be performed by skilled craftsmen qualified to perform the required work in a manner comparable with the best standards of practice. Continuity of personnel shall be maintained and transfers of key personnel shall be coordinated with the Architect.

C. The Contractor shall provide an English speaking supervisor at the work site during cleaning and application operations. The supervisor shall have the authority of sign change orders, coordinate work, and make decisions pertaining to the fulfillment of the contract.

D. Dust, dirt, oil, grease or any foreign matter that will affect the adhesion or durability of the finish must be removed by washing with clean rags dipped in an approved cleaning solvent and wiped dry with clean rags.

E. The Contractor's coating and painting equipment shall be designed for application of materials specified and shall be maintained in first class working condition. Compressors shall have suitable traps and filters to remove water and oils from the air. Contractor's equipment shall be subject to approval of the Architect.

F. Application of the first coat shall follow immediately after surface preparation and cleaning and before rust bloom or flash rusting occurs. Any cleaned areas not receiving first coat within this period shall be re-cleaned prior to application of first coat.

3.2 SURFACE PREPARATION

A. The latest revision of the following surface preparation specifications of the Steel Structures Painting Council and NACE shall form a part of this specification:

1. Solvent Cleaning (SSPC-SP1): Removal of oil, grease, soil and other contaminants by use of solvents, emulsions, cleaning compounds, steam cleaning or similar materials and methods which involve a solvent or cleaning action.

2. Hand Tool Cleaning (SSPC-SP2): Removal of loose rust, loose mill scale and other detrimental foreign matter to degree specified by hand chipping, scraping, sanding and wire brushing.

3. Power Tool Cleaning (SSPC-SP3): Removal of loose rust' loose mill scale and other detrimental foreign matter to degree specified by power wire brushing, power impact tools or
power sanders.

4. Brush-Off Blast Cleaning (SSPC-SP7/NACE 4): Brush-off blast cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust, and loose coating. Tightly adherent mill scale, rust, and coating may remain on the surface. Mill scale, rust, and coating are considered tightly adherent if they cannot be removed by lifting with a dull putty knife after abrasive blast cleaning has been performed.

5. Commercial Blast Cleaning (SSPC-SP6/NACE 3): Blast cleaning until at least 66 percent of each element of surface area is free or all visible residues.

6. Near White Blast Cleaning (SSPC-SP10/NACE 2): Blast cleaning to nearly white metal cleanliness, until at least 95 percent of each element of surface area is free of all visible residues.

7. Surface Preparation of Concrete (SSPC-SP13/NACE 6): This standard gives requirements for surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems.

8. Power Tool Cleaning to Bare Metal (SSPC-SP11): This standard covers the requirements for power tool cleaning to produce a bare metal surface and to retain or produce a minimum 25 micrometer (1.0 mil) surface profile. This standard is suitable where a roughened, clean, bare metal surface is required, but where abrasive blasting is not feasible or permissible.

B. Blast cleaning for all surfaces shall be by dry method unless otherwise directed.

C. Particle size of abrasives used in blast cleaning shall be that which will produce a 1.5 – 2.0 mil (37.5 microns - 50.0- microns) surface profile or in accordance with recommendations of the manufacturer of the specified coating or paint system to be applied.

D. Abrasive used in blast cleaning operations shall be new, washed, graded and free of contaminants that would interfere with adhesion of coating or paint and shall not be reused unless specifically approved by the Architect.

E. During blast cleaning operations, caution shall be exercised to insure that surrounding existing coatings or paint are not exposed to abrasion from blast cleaning.

F. The Contractor shall keep the area of his work and the surrounding environment in a clean condition. He shall not permit blasting materials to accumulate as to constitute a nuisance or hazard to the accomplishment of the work, the operation of the existing facilities, or nuisance to the surrounding environment.

G. Blast cleaned surfaces shall be cleaned prior to application of specified coatings or paint. No coatings or paint shall be applied over damp or moist surfaces.

H. Specific Surface Preparation: Surface preparation for the specific system shall be as noted in Section 2.01 Paragraphs D.

3.3 APPLICATION, GENERAL

A. Coating and paint application shall conform to the requirements of the Steel Structures Painting Council Paint Application Specification SSPC-PA1, latest revision, for "Shop, Field and Maintenance Painting," and the manufacturer of the coating and paint materials.

B. Thinning shall be permitted only as recommended by the manufacturer approved by the Architect, and utilizing the thinners stated in Section 2.01 Paragraphs D.

C. Each application of coating or paint shall be applied evenly, free of brush marks, sags, runs, with no evidence of poor workmanship. Care shall be exercised to avoid lapping on glass or hardware. Coatings and paints shall be sharply cut to lines. Finished surfaces shall be free from defects or blemishes.

D. Protective coverings or drop cloths shall be used to protect floors, fixtures, and equipment. Care shall be exercised to prevent coatings or paint from being spattered onto surfaces that are not to be coated or painted. Surfaces from which materials cannot be removed satisfactorily shall be recoated or repainted as required to produce a finish satisfactory to the Architect.

E. When two coats of coating or paint are specified, where possible, the first coat shall contain sufficient approved color additive to act as an indicator of coverage or the two coats must be of contrasting color.

F. Film thickness per coat specified in Section 2.01 Paragraphs F are minimum required. If roller application is deemed necessary, the Contractor shall apply additional coats as to achieve the specified thickness.

G. All material shall be applied as specified, unless approved in writing by the Architect.

H. All welds, edges and other irregular surfaces shall receive a brush coat of the specified product prior to application of the first complete coat.

3.4 COATING SYSTEMS APPLICATION

A. After completion of surface preparation as specified for the specific system, materials shall be applied as noted in Section 2.01 Paragraphs D.

3.5 COLOR SCHEME

A. Colors: Submittals will be made to the Architect and Owner for approval prior to application.

3.6 SOLVENT VAPOR REMOVAL

A. Where appropriate all solvent vapors shall be completely removed by suction-type exhaust fans and blowers before placing in operating service.

3.7 CLEAN UP

A. Upon completion of the work, all staging, scaffolding, and containers shall be removed from the site or destroyed in a manner approved by the Architect. Coating or paint spots and oil or stains upon adjacent surfaces shall be removed and the jobsite cleaned. All damage to surfaces resulting from the work of this section shall be cleaned, repaired, or refinished to the satisfaction of the Architect at no cost to the Owner.

3.8 WARRANTY

A. The Contractor will warrant the work free of defects in material and workmanship for a period of one year from the acceptance of the work. At the end of one year, the Contractor will return for a one-year anniversary inspection of the work. The Contractor will correct any deficiencies found with no cost to the owner. Inspections shall be conducted in to conform to owners spec.

END OF SECTION 09960

SECTION 10101 – VISUAL DISPLAY UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 DESCRIPTION OF WORK

A. Section Includes:

1. Wall-mounted, Coated Acrylic Dry-Erase Markerboards frameless with polished metal standouts.
2. Tack Boards.
3. Pull-Down Map. (Customized for Airport.)

1.3 REFERENCED STANDARDS

A. Underwriter’s Laboratory

1. Flammability – UL 94: Rating = 94HB; Class A

B. American Society for Testing Materials

1. ASTM B221 Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wires, Profiles and Tubes
2. Note: ASTM E84 - Standard Test Method for Surface Burning Characteristics for Building Materials - not applicable to determine smoke density for thermoplastics

C. American National Standards Institute (ANSI)

1. ANSI Z 97.1 Approved for Safety Glazing Materials Used in Buildings

D. Indoor Air Quality

1. Products have extremely low residual monomers – evidenced by the product being used in museum-quality art framing where outgassing would not be acceptable.

1.4 SUBMITTALS

A. Manufacturer's Instructions: Provide manufacturer's installation instructions.

B. Drawings: Provide dimensions for placement of each visual display unit as required.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Manufacturer shall have a minimum of 3 years experience in the manufacture of visual display boards.

B. Operation and Maintenance: Include data on regular cleaning, stain removal, and precautions.

1.6 PROJECT CONDITIONS

A. Field measure prior to installation and/or fabrication to ensure proper fit.

B. Comply with manufacturer's recommendations for acclimating area for interior moisture and temperature to approximate normal occupied conditions.

1.7 DELIVERY, STORAGE AND HANDLING

A. Schedule delivery of visual display boards with area sufficiently complete to allow installation after delivery.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Store materials protected from exposure to harmful weather conditions and at temperatures and humidity conditions recommended by manufacturer.

1.8 WARRANTY

A. Submit that under normal usage and maintenance, and when installed in accordance with manufacturer's instructions and recommendations, markerboards are warrantied for five years from the date of installation.

PART 2 - PRODUCTS

2.1 CORK BOARD WITH REINFORCEMENT

A. 4’-0” X 6’-0” wood framed cork and remarkaboard combination, as manufactured by Marsh Industries, Inc. Model # CW-406M, with ¼” thick fine grained natural cork and ¼” hardboard and full-length self tray. www.march-ind.com (303) 308-8865.

B. Framed Markerboards

   1. Basis of Design: Pro-Rite Markerboard, by Marsh Industries, Inc.

   2. Face Sheet Material: Porcelain enamel coated 24gauge steel.

   3. Face Sheet Material Standard: Manufactured in accordance with Porcelain Enamel Institute’s S-104 Performance Specification for Porcelain Enamel Markerboards and Chalkboards. Porcelain enamel finish shall be fusion bonded to steel substrate at lowest possible temperature to reduce steel and porcelain stresses and achieve superior enamel bond and hardness.

4. Core Material: ½" (12.7mm) Class"A" Rated Micore.

5. Panel Backing: (92gauge) Mylar Panel.

6. Laminations: Hot-type neoprene contact adhesive applied to both surfaces, each substrate having a minimum of 80% covering with 1.5-2.0 dry milos (0.038-0.051 mm) of adhesive. Panel components shall have uniform pressure applied mechanically over entire area. Laminations shall be made by face sheet manufacturer.

7. Size: As indicated on Drawings- 48" high maximum.

8. Color: White

9. Trim: Clear adonized satin finish.

10. Marker Tray: Continuous, shelf type aluminum tray with rounded edges; clear satin adonized aluminum.

11. Pro-Rite Markers- 1 Dozen assorted colors/ marker bowl.

12. Mar: Kleen Marker Board cleaner for each markerboard.

13. Brush eraser for each markerboard.

2.2 PULL DOWN MAP

A. By Owner.

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

A. Verify before installation that wall surfaces are true and plumb and are prepared and ready to receive markerboards and are not outside normal conditions (e.g. through dampness or lack of heat).

3.2 INSTALLATION

A. Handle and store markerboards in such a way as to prevent damage prior to installation.

B. Unpack items as near as practical to final installation location(s).

C. Remove markerboards and/or accessories from shipping containers with care to prevent damage to markerboard surfaces and metal frames.

D. Refer to drawings and schedules for mounting heights and locations.

E. Install level and plumb.

F. Coordinate installation with other finishes at mounting locations.

G. Secure framed cork board and markerboards with concealed mechanical fasteners, counter sunk within the frame.

H. Coordinate wood blocking concealed in wall for mounting of visual display units.

3.3 ADJUST AND CLEAN

A. Verify that all accessories are installed as required for each unit.

B. At completion of work, clean surfaces and trim in accordance with manufacturer's recommendations, leaving all materials ready for use.

END OF SECTION 10101

SECTION 10155 - TOILET PARTITIONS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Overhead Braced and Floor Mounted Toilet Partitions and wall hung Urinary Screens in locations indicated on the Drawings.

B. Related Sections include, but are not limited to:

1. Section 05500 - Miscellaneous Metals
2. Section 06100 - Rough Carpentry.
3. Section 09310 - Ceramic Tile

1.3 REGULATORY REQUIREMENTS

A. Conform to State of Florida Accessibility Code for Building, Latest Edition in effect (or Chapter 11 of Florida Building Code, Latest Edition in effect) for installing work in conformance with ANSI A 117.1.

1.4 SUBMITTALS

A. Product Data: Provide data on toilet partition and urinary screen materials, including catalog cuts of anchors, hardware, fastenings, and accessories.

B. Shop Drawings: Indicate partition plan and elevation views, dimensions, and details of wall supports.

C. Samples: Submit two samples 12 x 12-inches in size illustrating panel finish, color, and sheen.

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide phenolic partitions that comply with the following requirements:

1. Fire-Resistance Characteristics: Where indicated, provide toilet partitions identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities

having jurisdiction.

B. Surface-Burning Characteristics: Provide phenolic partitions with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products when tested per ASTM E 84:

1. Smoke-Developed Index: 70 or less for 3/4-inch thick and 85 or less for ½-inch material.

C. Stainless steel hardware shall comply with ASTM A 167, Type 304.

D. Concealed fasteners and leveling devices: galvanized steel; ASTM A 153.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pre-finished materials to the project site in original, unopened cartons or packaging materials necessary to protect structure and finishes. Label packages clearly with manufacturer’s name and item description.

B. Store compartment components in a vertical position with adequate support to ensure flatness and to prevent damage to pre-finished surface.

1.7 JOB CONDITIONS

A. Field Measurements: Verify actual locations of walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 COORDINATION

A. Furnish inserts and anchorages that must be built into other work for installation of toilet compartments and related items; coordinate delivery with other work to avoid delay.

1.9 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents, including but not limited to the Owner’s warranty requirements of the Div. 0 and Div. 1 specification requirements.

B. Submit written agreement on toilet partition manufacturer's standard form, signed by manufacturer, installer, and contractor, agreeing to repair or replace defective parts including, but not limited to doors, panels, and hardware, that do not comply

with referenced quality standards and plastic laminated materials that discolor or delaminate from the partition core.

1. Warranty Period: three years from date of Substantial Completion and Owner Final Acceptance.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Materials are specified by brand names to establish a basis for quality and design, or by performance requirements and general description of product. The Interior Designer or Architect will consider substitutions for brand names of products specified, provided the procedures set forth for substitutions are followed and the substitutions are equal or better than the approved products. The Architect reserves the right to reject any material which, in the Interior Designer's opinion, will not produce the quality of the work specified herein.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:

1. Ampco Products Inc. (305) 821-5700 www.ampco.com
2. Bobrick Washroom Equipment (800) 553-1600 www.bobrick.com
3. General Partitions Mfg. (814) 833-1154 www.genpartitions.com

C. One substitute manufacturer may be submitted for each product specified in this section, to Architect for review following procedures established in Section 01631 and upon receipt of completed Substitution Form.

2.2 PRODUCTS

A. Panel Construction: High pressure through color scratch resistant plastic laminate, NEMA LD 3, GP-50, 0.050-inch nominal thickness, color and pattern as selected by Architect; core of 1" thick, APA-Marine-Grade Plywood (exterior grade) with fully waterproof structural adhesive. Pilaster Shoes: ASTM A 167, Type 302/304 stainless steel, not less than 3" high, 20 gage, finished to match hardware.

B. Doors and Panels: 1 inch thick, face pressure bonded to core.

C. Partition Mounting & Style: Standard Overhead Braced and Floor Mounted.

1. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with anti-grip profile and in manufacturer's standard finish.

D. Screen Mounting & Style: Continuous – Stainless Steel "C" Channel Wall-Hung.

1. Support Brackets for Urinal Screens: Manufacturer's standard continuous stainless steel "C" channel bracket.

E. Brackets (Fittings):

1. Stirrup Type: Ear or U-brackets, ASTM A 167, Type 302/304 stainless steel, not less than 3" high, 20 gage, finished to match hardware.

F. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.

G. Hardware: Manufacturer's standard design, heavy-duty operating hardware and accessories of stainless steel.

1. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees and return to pre-set position when not locked. Hinge shall allow emergency access by lifting the door from the bottom.
2. Latch and Keeper: Manufacturer's standard recessed latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be accessible to people with disabilities.

3. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.

4. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.

5. Door Pull: Manufacturer's heavy duty-latch-type unit at out-swinging doors that complies with accessibility requirements of authorities having jurisdiction. Provide units on both sides of doors at compartments indicated to be accessible to people with disabilities.

2.3 FABRICATION

A. Fabricate components with plastic laminate finish to faces and edges of core material. Apply laminate to edges before broad surfaces to seal edges and prevent laminate from being pried loose. Seal exposed core material at cutouts to protect core from moisture.

B. Doors: Unless otherwise indicated, provide 24-inch-wide in-swinging doors for

standard toilet compartments and 36-inch-wide out-swinging doors with a minimum 32-inch-wide clear opening for compartments indicated to be accessible to people with disabilities unless noted otherwise on the drawings.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Verify that opening dimensions and plumbing fixture and rough-in locations are as indicated on shop drawings and have been verified in the field.

3.2 INSTALLATION

A. Install partition components secure, plumb, and level in accordance with manufacturer's instructions.

B. Attached panel brackets securely using anchor devices; anchors for urinal screens shall be set to ensure lateral loads are accommodated.

C. Provide adjustment for height variations with threaded rods through steel saddles. Conceal fastenings with pilaster shoes.

D. Equip each door with three hinges, one door latch, and one coat hook and bumper.

E. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and doors in entrance screens to return doors to fully closed position.

END OF SECTION 10155

SECTION 10200 - LOUVERS AND DAMPERS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Furnish all labor, materials, tools, equipment, etc. and services necessary and incidental to the complete fabrication, furnishing and erection of this section as shown, noted, detailed and reasonably implied on the Drawings and in the Specifications.

B. Refer to Mechanical Drawings and Specifications for additional louver requirements.

1.3 RELATED SECTIONS

A. Coordinate work of this Section with work of other Sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other Sections, including:

1.4 SUBMITTAL DATA AND SAMPLES

A. Submit shop drawings and product data under provisions of Section 01330 – Shop Drawings, Product Data and Samples.

B. Shop drawings showing locations of all louvers, size, shape and gauge of metal, method of anchoring, flashing, bracing and connect to work of other trades.

C. Draw profiles, sections, overall details, dimensions, and views of items at a scale large enough to permit checking for design conformity.

D. Submit manufacturer's printed data describing products, specifications, and their installations.

E. Submit engineering certifications, or FBC approved NOA certification, listed in Article 1.6 of this Section, demonstrating compliance with the wind loads shown on the Structural Drawings.

1.5 DELIVERY, STORAGE AND HANDLING

A. All materials shall be delivered to the project site in their original unbroken containers, bearing manufacturer's name and brand designation and specification number.

B. All materials shall be stored in a secured, dry and protected area, a minimum of 4 inches above concrete slab, and in accordance with Section 01600 – Materials and Equipment and Section 01620 – Storage and Protection.

1.6 DESIGN CRITERIA

A. Comply with the Florida Building Code – Latest Edition in effect and NFPA 101 – Current Edition. Nothing in this Section shall be construed as allowing or requiring noncompliance with the Code.

B. Design wind pressures, uplift loads and design wind speed shall be per FBC.

C. Wind pressures act perpendicular to flat surfaces, regardless of surface orientation. Wind pressures act perpendicular to tangents of curved surfaces. At corners and changes in plane, adjacent surfaces shall be assumed to experience the worst case combination of inward pressure simultaneously, outward pressure simultaneously, and simultaneous occurrence of inward pressure on one surface and outward pressure on adjoining surface.

D. A registered structural Engineer in the State of Florida shall design structural supports and anchors. (Also, the Engineer shall certify structural capacity of the louvers and dampers to be installed meet above design wind pressure.) Submit design calculations for information only.

1.7 WARRANTY

A. Refer to Section 01770 - Closeout Procedures, Detail Requirements and Section 01740 Warranties and Bonds.

B. Louver manufacturer shall supply in writing, at job completion, a ten (10) year warranty against failure of the powder coat finish, Powder Coat complying with AAMA 2604.criteria finish.

PART 2 – PRODUCTS

2.1 MATERIALS

A. The basis of design is Extruded Drainable Blade Louvers and Counterbalanced Relief Dampers (where scheduled) as manufactured by Greenheck .

B. Equivalent products manufactured by Airolite, Mestec Louver Group, Ruskin Louver Co. or approved equal are acceptable.

C. Refer to the Drawings for the Louver sizes and dimensions.

2.2 ALUMINUM LOUVERS - EXTERIOR

A. Impact-resistant exterior louvers shall be Greenheck Model No. EHV-901D Dual Module FBC/ Miami Dade approved Louvers, 9 inches deep, fixed blades at 45-degree angle at 6” o.c. spacing. 54% free area and class A wind driven rain classification.

1. Louvers must conform to Florida Building Code. Louver frames shall be reinforced with rear-mounted heavy gage perimeter steel channel. Louver sections with rough openings greater than 36 inches in width shall be provided with steel blade reinforcing angles concealed from view.

B. Aluminum shall be 6063-T5 extruded.

C. Blades: Minimum 0.125 inches thick by 6 inches deep; louver blade to frame connections shall be both mechanically fastened with 300 series stainless steel threaded fasteners and welded.

D. Jambs: Minimum 0.125 inches (8 gauge) thick.

E. All vertical mullions shall be the exposed type to provide for drainage of water from the blades to the louver sill.

F. Fasteners: Spacing and size per manufacturer, as required to meet required wind loads.

2.3 ACCESSORIES

A. All exterior louvers shall receive an extruded bird screen frame with 1/2 inch mesh, 0.063 inch wire diameter of aluminum material.

B. Extruded aluminum sill extension, extension length as to match assembly width.

C. Furnish and install aluminum subsill flashings and gutter system with end dams, set in full bed of sealant, at louver base. Minimum 12 gauge, color to match louver.

2.4 LOUVER AND DAMPER SIZES AND LOCATION

A. Louver sizes as required for ventilation and mechanical systems.

2.5 FASTENERS

A. Fasteners of sizes required by paragraph 1.6 D. above, shall be stainless steel Type 300 Series.

2.6 FINISHES: LOUVERS AND DAMPERS

A. Aluminum louvers, dampers, and accessories shall be finished with manufacture’s standard ten (10) year warranty powder coating that meets or exceeds AAMA 2604 criteria of custom color to match the building exterior or interior as selected by the Architect.

2.7 FINISHES: STEEL SUPPORTS

A. All steel supports shall be hot-dipped galvanized and shall be painted per Section 09900 - Painting, colors as selected by the Architect.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

A. All items in this Section shall be installed by experienced skilled mechanics in the best workmanlike manner of the trade's best standard practice.

B. All items shall be installed true, level, plumb, and in strict accordance with the manufacturer's printed instructions and approved submittals.

3.2 INSTALLATION

A. Aluminum exterior and interior louvers and dampers shall be installed with stainless steel fasteners and/or anchors.

B. Where aluminum is placed in contact with dissimilar materials, the aluminum shall be back-painted before erection with zinc chromate paint or bituminous coating.

C. After erection, the Contractor shall adequately protect exposed portions of louvers from damage by stucco, lime, cement, welding, or other harmful compounds.

D. All exposed surfaces shall be free from scratches and other serious surface blemishes.

3.3 CLEANING

A. The Contractor shall be responsible for removal of protective materials and subsequent cleaning. The Contractor shall be held responsible for damages resulting from the use of cleaning materials.

3.4 MATERIALS AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and be replaced with new material in the best workmanlike manner at no extra cost to the Owner.

END OF SECTION 10200

SECTION 10350 - FLAGPOLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes ground-mounted flagpoles made from aluminum.

B. Owner-Furnished Material: All flags.

C. Related Sections:

1. Division 16 Section "Exterior Lighting" for site lighting fixtures.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to the following design criteria:

1. Wind Loads: 140 mph, Exposure B according to NAAMM FP 1001, "Guide Specifications for Design of Metal Flagpoles." ; Refer to FBC wind speed design criteria.
2. Base flagpole design on polyester flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.

    a. Flag size – Minimum = 6’ X 10’.
    b. Top Diameter of flagpole foundation shall be stepped and not to exceed 9” in diameter and shall extend 6” below grade before widening; the depth of the foundation shall be as required to maintain this dimension and shall be isolated from adjoining paver and seat wall foundations.
    c. Shoe base trim shall be flush with adjoining pavers.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.

1. Anchor bolts for flagpole.

2. Manufactured flagpole foundation.
3. Foundation & design analysis to comply with FBC wind speed requirements sealed by a professional engineer licensed in the State of Florida.
4. Concrete mix design and placement criteria for flagpole foundations.
5. Sealant data & Sealant compatibility statement from sealant manufacturer stating Sealant compatible with adjoining substrates to be sealed.
6. Maximum wind speed for flag flying.

B. Shop Drawings: For flagpoles and foundation system. Include plans, elevations, details, and attachments to other work. Show general arrangement, jointing, fittings, accessories, grounding, anchoring, and support.

1. Section and details of foundation system for ground-mounted flagpole.

a. Include reinforcement drawings for flagpole foundation.

b. Isolate foundation of flag pole from event court foundation.

c. Base plate trim to be flush with pavers and shall have weeps for drainage.

d. Refer to details on Drawings for coordination of intergral trim and concrete finishes.

2. Anchor-bolt templates keyed to specific flagpole and certified by manufacturer.
3. Design calculations, certified by the qualified licensed Professional Engineer responsible for their preparation, licensed in the State of Florida.

C. Delegated-Design Submittal: For flagpole assemblies and foundation system indicated to comply with performance requirements and design criteria, including analysis data, project specific-foundation design signed and sealed by the qualified professional engineer responsible for their preparation.

D. Qualification Data: For qualified Licensed Professional Engineer.

E. Recycled content for sustainable design requirements, and other mnfg's certifications per Division 1 Section "Sustainable Design Requirements."

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain flagpole as complete unit, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. General: Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: American Flagpole; a Kearney-National Inc. company – Basis-of-Design.

B. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Concord Industries, Inc.
   2. Ewing Flagpoles.
   3. Pole-Tech Company Inc.

2.2 FLAGPOLES

A. Flagpole Construction, General: Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:

   1. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.
   2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.
   3. Provide self-aligning, snug-fitting joints.

B. Exposed Height: 25 feet above finish grade.

C. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, not less than 0.188-inch- nominal wall thickness. Provide with 3/16-inch steel bottom plate and support plate; 3/4-inch- diameter, steel ground spike; and steel centering wedges welded together. Galvanize steel after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole.

   1. Provide flashing collar of same material and finish as flagpole.
   2. Galv. corrugated steel ground sleeve w/ grounding spike.

2.3 FITTINGS

A. Finial Ball: Manufacturer's standard flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.

   1. 0.063-inch spun gold anodized aluminum.

B. Internal Halyard, Winch System (IWW): Manually operated winch with control stop device and removable handle, stainless-steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Provide flush access door secured with cylinder lock. Finish truck assembly to match flagpole; Beaded sling assembly. Revolving truck assembly with stainless steel bearings.

1. Halyard Flag Snaps: Provide two stainless-steel swivel snap hooks per halyard.

    a. Provide with neoprene or vinyl covers.

2. Provide one removable winch handle for each flagpole for use on either flagpole.

3. Keys to master keyed to building standard, provide 2 sets of keys for each flagpole.

2.4 MISCELLANEOUS MATERIALS

A. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.

B. Sand: ASTM C 33, fine aggregate.

C. Elastomeric Joint Sealant: Single-component neutral- and basic-curing silicone joint sealant complying with requirements in Division 07 Section "Joint Sealants" for Use NT (nontraffic) and for Use M, G, A, and, as applicable to joint substrates indicated, for Use O. Sealants shall be compatible with adjoining finishes and substrated.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, including foundation; accurate placement, pattern, orientation of anchor bolts, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.

B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.

C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concreting.

D. Place concrete, In accordance with foundation design Professional Engineer requirements and as specified in Division 3 Section "Cast-in-Place Concrete." Compact concrete in place by using vibrators. Moist-cure exposed concrete for not less than seven days or use nonstaining curing compound.

E. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.3 FLAGPOLE INSTALLATION

A. General: Install flagpoles where shown and according to Shop Drawings and manufacturer's written instructions.

B. Ground Set: Place foundation tube, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube and allow concrete to cure. Install flagpole, plumb, in foundation tube.

1. Foundation Tube: Place tube seated on bottom plate between steel centering wedges and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric joint sealant and cover with flashing collar.

C. Baseplate: Cast anchor bolts in concrete foundation. Install baseplate on washers placed over leveling nuts on anchor bolts and adjust until flagpole is plumb. After flagpole is plumb, tighten retaining nuts and fill space under baseplate solidly with nonshrink, nonmetallic grout. Finish exposed grout surfaces smooth and slope 45 degrees away from edges of baseplate. Top of flagpole shoe base shall be flush with adjoining pavers; provide weeps and method of drainage to drain away collected water within shoe base cavity.

END OF SECTION 10350

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SECTION 10426 - BUILDING SIGNAGE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Furnish all labor, materials, tools, equipment, etc. and services necessary and incidental to the complete fabrication, furnishing and erection of this Section as shown, noted, detailed and reasonably implied on the drawings and in the specifications.

B. The scope of work included in this Section is as follows:

1. Interior and Exterior Building Signs (Owner required and Code required).

1.3 RELATED SECTIONS

A. Coordinate work of this Section with of other Sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other Sections, including:

1. Division 15 – Mechanical & Plumbing. Equipment labeling.

2. Division 16 – Electrical. Illuminated exit signs and equipment labeling.

1.4 REFERENCES

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

i. American National Standards Institute (ANSI)
ii. American Society for Testing & Materials (ASTM)
iii. Federal Specifications
iv. Uniform Sign Code

1.5 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300 – Shop Drawings, Product Data and Samples.

B. Submit manufacturer's printed data describing products, model or series numbers, colors for selection, and finishes of all items in this Section.

1. Samples for Initial Selection: For each sign type and for each color and texture required, for each type of sign material indicated that involves color selection.

C. Submit shop drawings of all items, showing locations, sizes, quantities, methods of supporting, methods of anchoring, markings, finishes and operating hardware.

1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.

2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.

3. Provide signed and sealed engineered drawings for securement of the signs to the building exterior.

D. Submit samples of all signs for review, For each type of sign, include the following Samples to verify color selected:

1. Panel Signs: Full-size Samples of each type of sign required.

2. Approved samples will be returned for installation into Project.

E. Submit two (2) complete building signage schedules for review. After review, provide four (4) corrected copies of this schedule for distribution. No factory order shall be placed for materials until this review process has been completed.

F. Maintenance Data: For signage cleaning and maintenance requirements to include in maintenance manuals.

1.6 DELIVERY AND STORAGE

A. Deliver products to site under provisions of Section 01600 – Materials and Equipment.

B. All materials under this Section shall be delivered to the project site in their original unbroken containers bearing the manufacturer's name, brand and specification designation.

C. All materials shall be stored in a dry, protected area and above floor level.

1.7 COORDINATION

A. For signs supported by or anchored to permanent construction, advise installers of anchorage devices about specific requirements for placement of anchorage devices and similar items to be used for attaching signs.

1. For signs supported by or anchored to permanent construction, furnish templates for installation of anchorage devices and coordinate blocking requirements.

2. Field verify dimensions and conditions affecting sign installation.

1.8 CODES

A. All signage shall conform to the Department of Community Affairs, Florida Building Code Latest Edition in effect (FBC), Florida Accessibility Code for Building Construction, and local codes. Signage shall conform to ICC/ANSI A117.1, American National Standard for Accessible and Usable Buildings and Facilities.

1.9 WARRANTY

A. This manufacturer shall warranty against defects in materials and workmanship for a period of one (1) year from the date of substantial completion of the building.

B. Refer to Section - 01700 Project Closeout, Detail Requirements.

1.10 QUALITY ASSURANCE

A. All interior signage in this Section shall be fabricated by a single manufacturer with experience in providing work similar to that specified.

B. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1

C. The materials used shall have flammability and smoke values that meet the standards for flammability for interior materials.

D. Source Limitations: Obtain each sign type through one source from a single manufacturer.

PART 2 – PRODUCTS

2.1 BUILDING SIGNAGE

A. Building signage includes, but is not limited to: Code Required life safety signage and handicapped accessibility signage, room and/or room identification, Way finding/directional signage, and general informational signage.

2.2 SIGN TYPE - CODE REQUIRED & ROOM IDENTIFICATION SIGNAGE

A. Code required signage, products produced by 2/90 Sign Systms, PH (800) 777-4310, as the Project Basis of Design, shall be two toned acrylic plastic, embossed ADA, wall or door mounted, with tactile and braille graphics, or equal as approved by the Architect or Owner. The room identification signs shall match the graphics and colors of the room identification signs at selected and approved by the Owner.

1. Coordinate with the Owner and the Architect for mounting locations before anchorage to finished substrate. Refer to Florida Building Code, and Florida Accessibility Code for Building Construction.

2. Characters and background of all signs shall have eggshell, non-glare finish. Braille characters shall be same color as background.

3. Sign edges shall be smooth and free of saw marks and imperfections. The corners of the sign shall be square.

4. Mount signs with manufacturer's suggested permanent type mounting. Do not use double-sided vinyl tape.

5. The following manufacturers shall be considered as comparable products.

    a. Mohawk
    b. Andco Industries Corp.
    c. Best Manufacturing Co.
    d. The Super-sine Company
    e. ASI

G. Graphic Content and Style: Provide sign copy that complies with requirements for size, style, spacing, content, mounting height and location.

1. Type style shall be "OPTIMA," upper case, minimum 5/8 inch high. Lettering shall be computer generated, accurately reproducing the letter form.

2. All letters, numbers, and/or symbols shall contrast with the background, either light characters on a dark background or dark characters on a light background. Characters and background will have a non-glare finish.

3. Signage copy shall be accompanied by Grade 2 Braille. Braille shall be separated 12 mm (0.5-inch) from the corresponding raised character symbols. Grade 2 Braille translation to be provided by signage manufacturer.

4. Copy Position: As indicated on drawings, or where not indicated, centered/centered (cc) within the limits of the sign.

5. Text Height: As indicated on drawings or in signage schedule, or as follows:

    a. Lettering for room numbers shall be 25 mm (1-inch).
    b. Lettering for room ID signs shall be 16 mm (5/8-inch) or as noted.
    c. Lettering height for way finding signage shall be as per the Drawings.

6. Where graphic pictograms are indicated, symbol size shall be nominal 100 mm (4-inch) diameter.

H. Changeable Message Inserts: Provide changeable signs at all meeting rooms. Fabricate signs to allow insertion of changeable messages in the form of “IN-USE” slide-in inserts.

I. Tactile and Braille Sign: Manufacturer’s standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.

1. Panel Material: Opaque acrylic sheet or Photopolymer.

2. Raised-Copy Thickness: Not less than 0.8 mm (1/32 inch).

J. Laminated Interior Signs: Solid phenolic panel core with graphic image covered with thermosetting resin face layer.

1. Surface Finish: Mat.

2. Edge Condition: Manufactured standard.

3. Corner Condition: small radius.

4. Thickness: 3 mm (1/8 inch).

2.3 ACCESSORIES

A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

B. Fasteners anchored o aluminum substances or framing shall be stainless steel.

2.4 FINISHES, GENERAL

A. Protect mechanical finishes on exposed surfaces from damage by applying strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within range of approved Samples and are assembled or installed to minimize contrast.

2.5 ACRYLIC SHEET FINISHES

A. Colored Coatings for Acrylic Sheet: For copy and background colors, provide colored coatings, including inks, dyes, and paints, that are recommended by

acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for five years for application intended.

2.7 PIN MOUNTED SIGNAGE

A. Stainless Steel 316, pin letters , min. 3/8 inch thick, pin mounted,; font as shown on the drawings; to match the Airport standard.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Verify that items, including anchor inserts, provided under other sections of Work are sized and located to accommodate signs.

C. Examine supporting members to ensure that surfaces are at the elevations indicated or that may be required to comply with Authorities Having Jurisdiction and are free from dirt and other deleterious matter.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. The Architect and Owner shall have final decision on the location of all items in this Section.

B. After erection, the General Contractor shall adequately protect exposed portions of signage from damage by stucco, lime, cement, or other harmful compounds.

C. Do not mount signage on face of doors.

3.3 INSPECTION

A. Inspect building areas prior to sign(s) installation. Do not install signs until surfaces are acceptable to installer.

B. Notify the Architect and Owner, in writing, if there are any questions as to suitability of sign(s), installation location(s), or surface(s).

C. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer’s written instructions.

1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.

2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 75 mm (3 inches) of sign without encountering protruding objects or standing within swing of door.

D. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.

1. Silicone-Adhesive Mounting: Attach signs to irregular, porous, or vinyl-covered surfaces.

2. Shim Plate Mounting: Provide 3-mm- (1/8-inch-) thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other mounting methods are not practicable. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach panel signs to plate using method specified above.

3. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.

3.4 SIGNAGE SCHEDULE

A. A Signage Schedule shall be provided by the signage contractor per Article 1.4 Submittals, of this Section.

3.5 EXECUTION

A. All items in this Section shall be installed by experienced skilled mechanics in the best workmanlike manner of the trade's best standard practice.

B. All items shall be installed true, level, plumb and in strict accordance with the manufacturer's printed instructions and approved submittals.

3.6 GENERAL SIGNAGE

A. Wall mounted signs shall be installed 60 inches above finished floor to centerline of sign, and generally on latch side of door. Location shall be such that a person may approach within 3 inches of sign without encountering protruding objects or standing within swing of door.

B. Signs shall not be installed on the door.

3.7 CLEANING

A. The General Contractor shall be responsible for removal of protective materials and cleaning as recommended by manufacturer. The General Contractor shall be held responsible for damages resulting from the use of other cleaning materials.

3.8 MATERIAL AND WORKMANSHIP

A. All damaged material and faulty workmanship shall be removed and be replaced with new material in the best workmanlike manner at no extra cost to the Owner.

END OF SECTION 10426

SECTION 10507 – SOLID PLASTIC LOCKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Lockers with doors, frames, sides, tops, bottoms, backs, and shelves made from high impact, high density, polyethylene (HDPE) formed under high pressure into solid plastic components with homogeneous color throughout. The doors will be furnished in an accent color to be selected by the Architect and Owner from manufacturer's full range of colors.

1.3 PERFORMANCE REQUIREMENTS

A. Fire Resistance: Partition materials shall comply with the following requirements, when tested in accordance with the ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials:

1. Smoke Development Index: Not to exceed 450.
2. Flame Spread Index: Not to exceed 75.
3. Material Fire Ratings:

a. National Fire Protection Association (NFPA): Class B.
b. International Code Council (ICC): Class B.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, finishes for solid plastic lockers, and complete instructions.

B. Shop Drawings: For solid plastic lockers. Include plans, elevations, sections, details, and attachments to other work.

1. Show individual locker construction and overall dimensions.
2. Show details full size.

3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in solid plastic lockers.
5. Show solid plastic locker fillers, trim, base, sloping tops, and accessories.
6. Show solid plastic locker numbering sequence.

C. Samples for Initial Selection: For manufacturer's full range of solid plastic colors and finishes.

D. Samples for Verification: For the following:

1. Solid plastic panels, not less than 8 by 10 inches, for each type, color, pattern, and surface finish.
2. Exposed cabinet hardware and accessories, one unit for each type and finish.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For adjusting, repairing, and replacing solid plastic locker doors and latching mechanisms to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A company regularly engaged in manufacture of products specified in this Section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.

B. Installer Qualifications: A company or individual, regularly engaged in installation of products specified in this Section, with a minimum of 5 years experience.

C. Source Limitations: Obtain solid plastic lockers and accessories from single source from single manufacturer.

D. Regulatory Requirements: Where solid plastic lockers are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and FBC (latest edition adopted) Accessibility Guidelines for Buildings and Facilities."]

E. Contractor to coordinate and verify dimensions for built-in components / lockers.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver solid plastic lockers until painting and similar operations that could damage solid plastic lockers have been completed in installation areas. If solid plastic lockers must be stored in other-than-installation areas, store only in areas where environmental conditions are same as that in final installation location and comply with requirements specified in "Project Conditions" Article.

B. Locker components shall be stored flat until assembly. All finishes shall be protected from soiling and damage during handling.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install solid plastic lockers until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature between 60 and 90 deg F and humidity conditions at occupancy levels during the remainder of the construction period, or as required to prevent deformation or warping of the materials in accordance with the manufacturer’s requirements.

B. Field Measurements: Verify actual dimensions of concealed framing, blocking, and reinforcements that support wood lockers by field measurements before fabrication.

1.10 COORDINATION

A. Coordinate sizes and locations of concealed solid plastic support bases.

1. Requirements are specified in Division 6 Section "Miscellaneous Carpentry."

B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that solid plastic lockers can be supported and installed as indicated.

1.11 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of solid plastic lockers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures.
b. Faulty operation of locks or hardware.
c. Breakage, corrosion, and delamination of plastic under normal conditions.
d. Deterioration of other materials beyond normal use.

2. Warranty Period: Three years from date of Substantial Completion for all failures; Fifteen years from date of Substantial Completion for breakage, corrosion, and delamination of plastic.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Scranton Products; Tufftec Lockers or comparable product by one of the following:

1. ASI Storage Solutions, Inc.
2. General Partitions Mfg. Corp.
3. The Bradley Corporation.

2.2 MATERIALS

A. High Density Polyethylene (HDPE): Formed under high pressure into solid plastic components with homogeneous color throughout.

1. All solid plastic components shall resist deterioration and discoloration, when subjected to any of the following: acetic acid 80%, acetone, ammonia 12%, ammonium phosphate, bleach 12%, borax, brine, caustic soda, chlorine water, citric acid, copper chloride, core oils, hydrochloric acid 40%, hydrogen peroxide 30%, isopropyl alcohol, lactic acid 25%, lime sulfur, nicotine, potassium bromide soaps, sodium bicarbonate, trisodium phosphate, urea, urine and vinegar.

2. Testing in accordance with corrosion testing procedure established by the Unites States Plastic Corporation.

3. All HDPE components shall have a smooth “orange peel” finish. Locker doors and frames shall be two-tone color.

4. Color: As selected by Architect from manufacturer's full range.

a. Doors will be blue, or from manufacturer’s full range of colors as selected by Architect and Owner.
b. Frames and interior will be grey or from manufacturer’s full range of colors, as selected by Architect and Owner.

B. Adhesives: Adhesives shall not contain urea formaldehyde.

C. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

D. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.

1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as indicated on Drawings.
2. Provide toothed-steel or lead-expansion sleeves for drilled-in-place anchors.

E. Support Base: Manufacturer's standard.

2.3 SOLID PLASTIC LOCKER HARDWARE

A. General: Provide manufacturer's standard solid plastic locker hardware complying with the requirements in this Section. Lockers shall be capable of being locked with Owner furnished pad locks.

B. Continuous Hinges: Heavy duty extruded aluminum with powder coating to match the locker door and frame

1. Door hinge shall be full length assembled onto the door and front.

C. Exposed Hardware Finishes: Manufacturer’s standard.

2.4 CONTINUOUS LATCH

A. General: HDPE plastic latch capable of accepting pad lock.

1. Latch shall be securely fastened to the entire length of the door.

2. Pad locks shall be furnished by Owner.

2.5 SOLID PLASTIC LOCKERS

A. Doors and frames shall be made from HDPE into solid plastic components 1/2” thick.

1. 12”w x 18” d, with lattice mesh louvers.
2. Double tier with lattice mesh louvers, as illustrated in the Drawings, as required for accessibility, with ADA engraved logo.

B. Sides, tops, bottoms, backs, and shelves shall be made from HDPE into solid plastic components 3/8” thick.

1. Components shall have machined edges to accept assembly brackets.

C. Assembly profile shall be full depth, width and height of the lockers. Profiles shall be made from PVC plastic and snapfit assemble onto locker outsides, insides, backs, tops and bottoms.

2.6 LOCKER ACCESSORIES

A. Coat Hooks: Manufacturer's standard, high impact plastic.

1. Provide two-prong hook mounted to bottom of the shelf or divider, one each per door opening.

B. Number Plates: 1-1/2-inch- (38-mm-) diameter, etched, embossed, or stamped, stainless-steel plates with black numbers and letters at least 1/2 inch (13 mm) high. Identify lockers in sequence indicated on Drawings, or as approved by the Architect.

2.7 FABRICATION

A. Fabricate each solid plastic locker with shelves, an individual door and frame, an individual top, a bottom, and a back, and with common intermediate uprights separating compartments.

1. Fabricate solid plastic lockers to dimensions, profiles, and details indicated.
2. Lockers shall be manufactured for assembly in a group of no more than four adjacent lockers.
3. Provide sloped tops at lockers where no soffit is provided and the tops all exposed below the milling.

B. Fabricate components square, rigid, without warp, and with finished faces flat and free of scratches and chips. Accurately machine components for attachments in factory. Make joints tight and true.

1. Solid plastic components shall snap or mechanically fastened together for easy assembly and shall provide a solid and secure construction.

C. Fabricate steel tube frame and plywood decking support bases as required for lockers to be supported from the locker bench frame.

D. The ADA symbol shall be engraved on the lower door of one of the pair of double tier lockers for the ADA accessible locker.

E. Accessible Lockers: Fabricate as follows:

1. Locate bottom shelf no lower than 15 inches above the floor.
2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.

F. Venting: Fabricate lockers with space between doors and locker assembly of not less than **1/4 inch**.

G. Number Plates: Surface mounted or inlay number plates at each locker door, near top, centered.

H. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

I. Shop cut openings, to maximum extent possible, to receive hardware, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand or polish edges of cutouts to remove splinters and burrs.

J. Manufacturer's standard trim or filler panel at abutting wall conditions, to match locker face.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting wood locker installation.

B. Verify that furring is attached to masonry walls that are to receive wood lockers.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Condition solid plastic lockers to average prevailing humidity conditions in installation areas before installation.

B. Before installing solid plastic lockers, examine factory-fabricated work for completeness and complete work as required, including removal of packing.

3.3 INSTALLATION

A. Install support base.

B. Install solid plastic lockers level, plumb, and true; use concealed shims.

C. Connect groups of solid plastic lockers together with manufacturer's standard fasteners, through predrilled holes, with no exposed fasteners on face frames. Fit solid plastic lockers accurately together to form flush, tight, hairline joints.

D. Install solid plastic lockers at the location shown in accordance with the manufacturer's instructions for plumb, level, rigid and flush installation.

E. Install solid plastic lockers without distortion so doors fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings, providing unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Installation Tolerance: No more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line. Shim as required with concealed shims.
2. Fasten solid plastic lockers through back, near top and bottom, at ends with manufacturer's standard fasteners and in accordance with manufacturer's instructions for penetration into substrate provided.

F. Scribe and cut corner and filler panels to fit adjoining work using fasteners concealed where practical. Repair damaged finish at cuts.

G. Install number plates after solid plastic lockers are in place.

1. Attach number plate on each solid plastic locker door, near top, centered, with at least two screws with finish matching number plate.

3.4 ADJUSTING, CLEANING, AND PROTECTING

A. Clean, lubricate, and adjust hardware. Adjust doors to operate easily without binding.

B. Protect solid plastic lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.

C. Touch up marred finishes, or replace solid plastic lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by wood locker manufacturer.

END OF SECTION 10507

SECTION 10520 – FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Portable fire extinguishers and mounting brackets for wall-hung fire extinguishers.

2. Fire-protection cabinets for the following:

a. Portable fire extinguishers.

3. Portable Fire Extinguishers.

4. Portable Fire Extinguishers Mounting Brackets.

5. AED Equipment Cabinet.

1.3 SUBMITIALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.

1. Fire Extinguishers: Include rating and classification.
2. Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

B. Operation and Maintenance Data: For fire extinguishers and cabinets to include in maintenance manuals.

C. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain fire extinguishers and cabinets through one source from a single manufacturer.

B. Size Limitations: Provide fire-protection cabinets having dimensions that match or are less than the width, depth and projection from wall dimensions of the specified cabinets.

C. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."

D. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

E. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements of ASTM E 814 for fire-resistance rating of walls where they are installed.

1.5 COORDINATION

A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and location of fire-protection cabinets with wall depths.

1.6 SEQUENCING

A. Apply labels/lettering on field-painted fire-protection cabinets after painting is complete.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure of hydrostatic test according to NFPA 10.
b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CABINET MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:

1. Sheet: ASTM B 209.
2. Extruded Shapes: ASTM B 221.

C. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.2 MANUFACTURERS

A. Basis of Design: J. L. Industries model # C1027V10 or # FX C1027V10 (rated walls) semi recessed, powder coated-painted steel 1 and ½" radiused trim (white), contemporary vertical duo – door style, with clear tempered glass, and Futura Embossed "Fire" Handle – Mill finish, with aluminum tub and integral lock, or approved equal by Architect. Furnish and install tamper resistant break away cables.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. J.L. Industries, Inc.
2. Larsen's Manufacturing Company.
3. Potter-Roemer; Div. of Smith Industries, Inc.

2.3 ACCESSORIES

A. Mounting Brackets: Manufacturer's standard steel, designed to secure extinguisher, of sizes required for types and capacities of extinguishers indicated, with plated or black baked-enamel finish.

1. Provide brackets for extinguishers not located in cabinets.
2. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.
3. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
4. Door Lock: Cylinder Lock, keyed alike to other cabinets and facility standard.
5. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
    a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISERS".
        i. Location: Applied to cabinet door.
        ii. Application Process: Silk-screened.
        iii. Lettering Color: Red.
        iv. Orientation: Vertical.

2.4 CABINET FABRICATION

A. Non-rated Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.

B. Rated Fire Protection Cabinets (where mounted in rated walls): Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.0428-inch thick, cold-rolled steel sheet lined with minimum 5/8 inch thick,

fire-barrier material. Provide factory-drilled mounting holes.
2. Provide with rating to match wall rating within which cabinet is to be installed.

C. Cabinet Doors: Fabricate doors according to manufacturer's standards, from material indicated and coordinated with cabinet types and trim styles selected.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
2. Miter and weld perimeter door frames.
3. Continuous hinge.

D. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 STEEL FINISHES

A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No.1, "White Metal Blast Cleaning" or SSPCSP 8, "Pickling". After cleaning, apply a conversion coating suited to the organic coating to be applied over it.

B. Factory Prime chromate-free, pretreatment. Finish: Apply manufacturer's standard, fast-curing, lead- and universal primer immediately after surface preparation and

C. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
1. Color and Gloss: Matte white.

2.7 AED CABINET

1. AED equipment and AED training provided by Owner.

2. Cabinet Type Basis of Design: JL Industries or Architect approved equal: Semi-recessed with 2 ½” rolled edge, powder coated aluminum - (white) – Model No. 1427F12.

2.8 PORTABLE FIRE EXTINGUISHERS

A. Manufacturers:

1. General Fire Extinguisher Corporation.
2. JL Industries, Inc.
3. Larsen's Manufacturing Company.
4. Potter Roemer; Div. of Smith Industries, Inc.

B. General: Provide fire extinguishers of type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.

1. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix b and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.

C. Regular Dry-Chemical Type in Steel Container: UL-rated, 10 B:C, 5-lb nominal capacity, with sodium bicarbonate-based dry chemical in enameled-steel container. Provide with recessed cabinets at locations shown on the drawings

D. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:60-B:C, 10-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container. Provide (3) with bracket mounts to be used at non-public spaces such as mechanical equipment rooms.

2.9 MOUNTING BRACKETS

A. Manufacturers:

1. Amerex Corporation.
2. Ansul Incorporated.
3. Badger Fire Protection.
4. Buckeye Fire Equipment Company.
5. Fire End & Croker Corporation.
6. General Fire Extinguisher Corporation.
7. JL Industries, Inc.
8. Larsen's Manufacturing Company.
9. Potter Roemer; Division of Smith Industries, Inc.

B. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
1. Color: Black.

C. Identification: Lettering complying with authorizes having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
a. Orientation: Vertical

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for hose valves and cabinets to verify actual locations of piping connections before cabinet installation.

B. Examine walls and partitions for suitable framing depth and blocking where recessed cabinets are to be installed.

1. Rated Partitions and Barriers: Examine to confirm construction meets rating requirements and is routed continuously "floor to ceiling." Notify Architect if partition/barrier rating will be compromised by cabinet installation.

C. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged units.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for recessed fire protection cabinets as required by type and size of cabinet and trim style. Coordinate and verify depth of recess required during framing and rough in of walls.

3.3 INSTALLATION

A. General: Install fire protection cabinets and fire extinguishers in locations.

1. Comply with ADA Guidelines' "reach range" dimensions for maximum mounting heights of cabinets, extinguishers, and other emergency equipment.

2. Coordinate door handle height and cabinet mounting height where cabinets are mounted with non standard manufacture heights.

B. Fire Protection Cabinets: Fasten cabinets to structure and framing, square and plumb provide required blocking to support cabinet and fire extinguisher.

1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is not adequate for recessed, provide semi-recessed fire-protection cabinets.

2. Provide inside latch and lock for break-glass panels.

3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

C. Identification: Apply labels/lettering at locations indicated.

D. Examine walls and partitions for suitable framing depth and blocking where

recessed cabinets will be installed.

E. Install fire-protection specialties in locations and at mounting heights indicated or, if not indicated, at heights acceptable to Authorities Having Jurisdiction.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturers written installation instructions.

B. Adjust fire protection cabinet doors to operate easily without binding.

C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.

E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10520

SECTION 10712 – FIBERGLASS SHUTTERS

PART 1 -- GENERAL

1.1 RELATED WORK

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Functional exterior shutters.
2. Exterior shutter hardware.

1.3 RELATED SECTIONS

A. Section 09900 – Paints and Coatings.

1.4 REFERENCES

A. ASTM E 330 – Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
B. ASTM E 1886 – Standard Test method for performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Missiles and Exposed to Cyclic Pressure Differentials.
C. ASTM E 1996 – Standard Specification ofr Performance of Exterior Windows, Curtain Walls, Doors and Strom Shutters Impacted by Windborne Debris in Hurricanes.

1.5 ACTION SUBMITTALS

A. Submit items per the provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Show materials, layout, dimensions, profiles, fasteners and anchors, hardware, finishes, and interface with adjacent construction.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's 40 standard colors.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and textures.

F. Florida Product Approval- NOA or engineered submittal showing compliance with wind speed requirements.

1.6 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.8 QUALITY ASSURANCE

A. Storm Rated Hurricane Shutters: The completed shutter assembly conforms to:
1. ASTM E 330 for Static Air Pressure.
2. ASTM E 1886 and ASTM E 1996 for large missile impact and cyclic pressure loading.

B. Thermal Stability: Fiberglass louvers and side rails thermally stable from minus 100 degrees F (minus 38 C) to 200 degrees F (93 C).

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer's original, unopened packaging, with labels clearly identifying product name and manufacturer.

B. Store products in manufacturer’s unopened packaging until ready for installation.

C. Store materials in a clean, cool and dry area in accordance with manufacturer’s instructions. Do not leave unopened shutters in direct sunlight.

D. Protect materials during handling and installation to prevent damage.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

A. Provide with a limited lifetime warranty on structural components and manufacturers defects and factory applied finish. Warranty is limited to the original purchaser.

B. Provide a limited ten year warranty on structural components and factory applied paint finish.

PART 2 -- PRODUCTS

2.1 MANUFACTURED UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Atlantic Premium Shutters – The Tapco Group
   29797 Beck Rd.
   Wixom, MI 48398-2834
   Tel: 866-288-2726
   Wayne_Sanderson@tapcoint.com

2.2 Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.1 SHUTTERS

A. Bahama Shutters: Atlantic Architectural Collection Bahama Shutters fabricated of pultruded fiberglass for vertical stiles, horizontal rails and horizontal louvers. Finished shutter is 1--1/4 inch (32 mm) thick. Shutters are finished with two part urethane paint, oven cured.
   1. Style:
      a. Additional rails
      b. Standard with Additional vertical mullion
   2. Width:
      a. Double panel with vertical mullion, full width of the window
   3. Height:
      a. As indicated on the Drawings
   4. Colors:
      a. Custom color as selected by Architect

B. Atlantic Architectural Collection Bahama Shutter Hardware only.
   1. Hardware:
      a. Male Hinge:
         1) Plate size -- 1--1/8 inch (28 mm) backplate.
      b. Female Hinge, 3--3/8 inch (86 mm):
         1) Plate size 1--1/4 inch (32 mm) with 1/4 inch (6 mm) lip.
         2) Projection 3--3/8 inch (86 mm).
      c. Tilt Arms:
         1) Black Anodized tilt arms with nylon end caps.
         2) Nylon hinges/eye end sets.

3) Stainless steel clevis pin.

e. Locking bar and mounting brackets.

PART 3 -- EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Commencement of work will imply acceptance of substrate.

3.2 EXAMINATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer’s instructions and with no fasteners through the face of the shutters.

B. Adjust operable units for smooth unobstructed operation.

3.4 PROTECTION

A. Protect installed products from damage by weather and other work until Date of Substantial Completion.

B. Touch-up and repair damaged products before Date of Substantial Completion.

END OF SECTION 16425

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SECTION 10801 – TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Toilet and bath accessories.
2. Childcare accessories.
3. Under lavatory guards.
4. Custodial accessories.

B. Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.

C. Related Sections:

1. Division 5 Section “Metal Fabrications” for corner guards.
2. Division 6 Section “Miscellaneous Carpentry” for wood blocking.
3. Division 8 Section “Mirrors” for frameless mirrors.
4. Division 9 Section "Ceramic Tile" for ceramic toilet and bath accessories.
5. Division 10 Section "Toilet Compartments" for plastic laminate units.
6. Division 16 Section “Interior Lighting” for lighting and electrical drawings at backlit mirrors.

1.3 QUALITY ASSURANCE

A. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet and Bath Accessory Schedule.

1. Products of other manufacturers listed in Part 2 with equal characteristics, as judged by Architect and Owner, may be provided.
2. Do not modify aesthetic effects, as judged by Architect and Owner. Where modifications are proposed, submit comprehensive explanatory data to Architect and Owner for review.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include operating characteristics, dimensions of individual toilet and bath accessory, and finishes for each toilet and bath accessory.

B. Toilet and Bath Accessory Schedule: For toilet and bath accessories; use same designations indicated on Drawings or Schedule as specified.

C. Maintenance Data: For each product to include in maintenance manuals.

D. Warranties: Special warranties specified in this Section.

1.5 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

C. Field verify depths of wall cavities, mounting heights, blocking requirements, locations do not interfere with door swings or use of accessory, etc. for all accessories.

1.6 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Manufacturer's Mirror Warranty: Written warranty, executed by mirror manufacturer agreeing to replace mirrors that develop visible silver spoilage defects within minimum warranty period indicated.

1. Minimum Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide accessories by one of the following:

1. Toilet, Bath, and Custodial Accessories:

a. Basis-of-Design shall be Bobrick Washroom Equipment, Inc.
b. The following manufacturers shall be acceptable provided products meet or exceed the specified or scheduled accessories; and are approved by the Architect and Owner:

1) American Specialties, Inc.
2) Bradley Corporation.

3) GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.

2. Childcare Accessories:

a. Basis-of-Design shall be Koala Kare Products; a division of Bobrick Washroom Equipment, Inc.
b. The following manufacturers shall be acceptable provided products meet or exceed the specified or scheduled accessories; and are approved by the Design Build Architect:

1) American Specialties, Inc.
2) Diaper Deck & Company, Inc.
3) GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.

3. Bench Seat:

a. Basis-of Design shall be INVISIA ADA fold down shower seat - Brushed nickel.

b. No substitutions

B. Products: Subject to compliance with requirements, provide products indicated for each designation in the Toilet and Childcare Accessory Schedule at the end of Part 3 or equal approved by the Architect and Owner.

2.2 MATERIALS

A. Metals

1. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch minimum nominal thickness, unless otherwise indicated.
2. Galvanized Steel Sheet: ASTM A 653/A 653M, G60

B. Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.

C. Accessories:

1. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
2. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.
3. Blocking: Fire retardant or galvanized metal blocking (12 GA) where scheduled or required to support accessory.

2.3 FABRICATION

A. General: One, maximum 1-1/2-inch diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.

B. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.

C. Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.

1. Provide galvanized steel backing sheet, not less than 0.034 inchand full mirror size, with non-absorptive filler material. Corrugated cardboard is not an acceptable filler material.

D. Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:

1. Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

E. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

F. Toilet Paper Spindles/Dispensers: All Toilet paper dispensers shall be provided with spindles to accommodate coreless toilet paper rolls; 1-inch minimum diameter. Confirm size of spindle with the Airport prior to ordering materials. Provide left hand or right-hand dispensers depending on toilet configuration and orientation. Through partition units only serving one toilet compartment or stall shall be provided with a solid door panel on the adjacent stall, where no dispenser is required.

G. Paper Towel Dispensers/Guides: Shall be provided with custom plastic guide inserts to prevent multiple paper towel dispensing at each use. The paper towel and mirror units shall be back lit and custom fabricated to match the design and as shown or scheduled.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated. Confirm clearances, wall depths, and blocking requirements prior to framing walls. Comply with FBC Accessibility mounting height and spacing requirements.

B. Furnish and install the left-hand toilet paper and toilet seat dispenser unit at left hand configured toilets and the right-hand unit at right hand configured toilets. Provide solid face doors at single-through wall-unit applications, where only one toilet compartment requires

a dispenser. The dispensers shall be flush with the partition at toilet stalls with grad bars. Ensure that the doors to service the units can open when installed and not in conflict with toilet fixtures.

C. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.

D. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446. Install shower seats to withstand a downward load of at least 360 Lbs.

E. Under lavatory Guards: Where this designation is indicated at all exposed plumbing pipe locations and/or where needed to prevent direct contact with and burn from piping, provide under lavatory guards complying with the following:

1. Manufacturers: Available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Plumberex Specialty Products, Inc.
   b. Truebro by IPS Corporation.

2. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
3. Material and Finish: Antimicrobial, molded plastic, white.
4. Refer to plumbing fixture schedule for sinks with ceramic or porcelain shrouds.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.3 TOILET AND BATH ACCESSORY SCHEDULE

A. **Back Lit Mirror:** (**A01)** provide A02 mirror unit (at all sinks) complying with the following:

1. Products: Available products include the following:

   a. Manufacturer: Bobrick Washroom Equipment, Inc./GAMCO
   b. Product: Backlit mirror with custom (mirror size 18” wide by 37” high) framed-hinged mirror, with custom integral “C” fold-paper towel dispenser and towel mate (262-130) paper dispenser guide.

B. **ADA Sink Mirror: (A02)**

1. Products: Available products to include the following:
   a. Manufacturer: Bobrick (B290 Series)
   b. Product: Surface mounted mirror (mirror size 18” wide by 46” high) framed mirror; align top and bottom with counter mirrors.
   c. Stainless Steel, Welded-frame Mirror: Fabricate frame from stainless-steel angles in manufacturer's standard satin finish with corners welded, edge ground and polished smooth.

C. **Full Height Mirror: (A03)**

1. Products: Available products include the following:
   a. Manufacturer: Bobrick, (B290 Series)
   b. Full height mirror (2’6” x 6’10”) as shown on the drawings, with stainless steel trim.
   c. Stainless Steel, Welded-frame Mirror: Fabricate frame from stainless-steel angles in manufacturer's standard satin finish with corners welded, edge ground and polished smooth.

D. **Sloan Soap Dispenser:** (**A04),** mount at ADA sink and counter sinks (typ).

1. Products: Available products include the following:
   a. Manufacturer: Sloan.
   b. Product: Sloan model SJS-1750.

E. **Countertop:** (**A05),** Solid surface countertop.

1. Products: Quartz Solid Surface Countertop.

F. **Through Counter Trim/ Waste Chute: (A06)**

1. Products: Quartz Solid Surface to match the Countertop.

G. **Robe Hook:** (**A07) (Double Hook)**:

1. Products: Available products include the following:
   a. Manufacturer: Jacknob
   b. Product: model 4290
2. Concealed fasteners; stainless steel

H. **Toilet Partition:** (**A08)**

1. Products: Plastic Laminate with marine grade plywood core, reference Toilet Compartment Specifications:

I. **ADA Toilet Partition Door Bumper: (A09)**

1. Products: Available products include the following:
   a. Manufacturer: Jacknob
   b. Product: Model 4151; stainless steel.
2. Mount at top and bottom of the door; (2) two per door.

J. **Coat Hook and Door Bumper:** (**A10)**, provide coat hook with bumper (at restroom toilet stalls and ADA accessible restrooms) complying with the following:

1. Products: Available products include the following:
   a. Manufacturer: Jacknob
   b. Product: Model 4003
2. Description: Surface-mounted stainless-steel hook and bumper to partition at all toilet stalls and ADA stall; do not mount to door.
3. Materials and Finish: Stainless steel with satin finish.

K. **Urinal Screen Bracket: (A011)**

1. Products: Available products include the following:
   a. Manufacturer: Jacknob
   b. Product: Model 2369; stainless steel
2. Full length of urinal screen; provide treated wood blackening concealed within the wall

L. **Grab Bars: (A12 – 36", A13 – 42" & A25 @ ADA Shower)** provide grab bar (at all accessible toilet stalls, showers, and restrooms) complying with FBC accessibility code and with the following:

1. Products: Available products include the following:
   a. Manufacturer: Bobrick
   b. Product: Model B-6806 Series (by bar length – 36 INCH and 42 INCH) Grab Bar. (A12 & A13)
   c. Toilet Compartment grab bars complying with FBC.
   d. Style and Length
      1) Provide 42" long horizontal and 36" long grab bars at ADA toilets
      2) Provide both horizontal and vertical bars in conformance with ANSI A117.1, 604.5.
      3) At ADA Showers provide horizontal "L" Shaped bars B-58616 (32" x 24") (A25); short leg at back of wall of transfer shower; provide vertical grab bar B5806 x 36" where required by code.
2. Stainless-Steel Nominal Thickness: Minimum .047244 inches.
3. Mounting: Concealed with manufacturer's standard flanges and anchors.
4. Gripping Surfaces: Manufacturer's standard slip-resistant texture.
5. Outside Diameter: 1-1/2 inches for heavy-duty applications.
6. Length: As indicated in Toilet Accessory Schedule on Drawings.
7. Blocking: Fire retardant wood or heavy ga (12 GA) galvanized steel.

M. **Toilet Paper and Seat Cover Dispenser:** (**A14)**, provide recessed dispenser (at wall locations) complying with the following:

1. Products: Available products include the following:
   a. Manufacturer: Bobrick
   b. Product: Model B-347/B-3574 Stainless Steel Toilet Seat Cover Dispenser. Provide napkin disposal for women's restroom.
2. Description: Partition Surface Mounting. Recessed Wall Mounted.
3. Minimum Capacity: 250.

4. Material and Finish: Stainless steel, No. 4 finish (satin).
5. Mounting height: 48” max AFF mounting height. ADA stalls require accessible clear floor area. Do not obstruct required grab bar clearances.
6. Description: Roll-in-reserve dispenser with a flush tumbler lockset.
7. Operation: Spindles (2) – heavy-duty, 1” diameter for coreless toilet paper one-piece, molded ABS. Theft-resistant. Retained in dispensing mechanism when door is locked.
8. Capacity: Unit holds two standard toilet tissue rolls up to 5-1/4” diameter.
9. Provide left- or right-handed unit based on orientation and mount to tissue paper holder close to toilet per FBC requirements.

N. **Toilet Paper and Seat Cover Dispenser: (A15)** Provide toilet partition mounted complying with the following:

1. Products: Available products include the following:
   a. Manufacturer: Bobrick
   b. Product: Model B-357/B-3571 Stainless Steel Toilet Seat Cover Dispenser. Provide napkin disposal for women’s restroom.
2. Description: Partition Surface Mounting. Recessed Wall Mounted.
3. Minimum Capacity: 250.
4. Material and Finish: Stainless steel, No. 4 finish (satin).
5. Mounting height: 48” max AFF mounting height. ADA stalls require accessible clear floor area. Do not obstruct required grab bar clearances.
6. Description: Roll-in-reserve dispenser with a flush tumbler lockset.
7. Operation: Spindles (2) – heavy-duty, 1” diameter for coreless toilet paper one-piece, molded ABS. Theft-resistant. Retained in dispensing mechanism when door is locked.
8. Capacity: Unit holds two standard toilet tissue rolls up to 5-1/4” diameter.
9. Provide left- or right-handed unit based on orientation and mount to tissue paper holder close to toilet per FBC requirements.
10. Provide back to back unites where possible, and single faced units when no framed walls are available.

O. **Diaper-Changing Station:** (**A16)** Provide diaper-changing station (Public ADA accessible toilets) complying with the following:

1. Products: Available products include the following:
   a. Manufacturer: Koala Kare Products; a division of Bobrick Washroom Equipment, Inc.
   b. Product: Model K110-SSRE Horizontal Recessed-Mounted Stainless-Steel Finish Baby Changing Station.

2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.
3. Mounting: Recessed mounted, flush with wall when closed.
4. Operation: By pneumatic shock-absorbing mechanism.
5. Material and Finish: Stainless steel, No. 4 finish (satin), exterior shell with rounded plastic corners; HDPE interior in manufacturer's standard color.
6. Liner Dispenser: Built in.
7. Comply with all ADA accessibility clearance and approach requirements.
8. Cover all mounting holes not used for installation

P. **Sanitary Napkin Vendor:** (**A17)** Provide sanitary napkin vendor (at all women's restrooms) complying with the following:

1. Products: Available products include the following:
   a. Manufacturer: Bobrick Washroom Equipment, Inc.
   b. Product: Model B47063 Fully Recessed Napkin/Tampon Vendor. ADA compliant with push button operation.
2. Mounting: Fully recessed.
3. Operation: 50 cents charge; to be confirmed with Owner
4. Exposed Material and Finish: Stainless steel, No. 4 finish (satin).
5. Lockset: Tumbler type with separate lock and key for coin box.
6. Refill: Top fill.

Q. **Combination Recessed Towel Dispenser / Waste Receptacle:** (**A018),** provide combination paper towel dispenser/waste receptacle complying with the following:

1. Products: Available products include the following:
   a. Manufacturer: Bobrick Washroom Equipment, Inc.
   b. Product: Model B-3940/367-60 (12 Gallon Bin) Recessed Paper Towel Dispenser and Waste Receptacle.
2. Mounting: Recessed.
3. Minimum Towel-Dispenser Capacity: 600 C-fold, 800 multifold, or 1100 single fold paper towels.
4. Minimum Waste-Receptacle Capacity: 12 gal.
5. Material and Finish: Stainless steel, No. 4 finish (satin).
6. Waste-Container: Removable, leakproof, rigid molded plastic.
7. Lockset: Tumbler type for towel-dispenser compartment and waste receptacle.

R. **Utility Shelf with Mop and Broom Holders:** (**A19),** provide utility shelf with mop and broom holder (at all janitor's closets with a mop sink) complying with the following:

1. Products: Available products include the following:
   a. Manufacturer: Bobrick Washroom Equipment, Inc.
   b. Product: Model B-224x36 Utility Shelf with Mop/Broom Holders and Rag Hooks.

2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
3. Length: 36 inches.
4. Hooks: Three.

S. **Chemical Dispenser:** (**A20)**

1. Provided by Owner's maintenance vendor.
2. Provide water hood-up to chemical dispenser
3. Mount over mop sink

T. **Corner Guard: (A21)**

1. Products: Refer to metal fabrications for additional information
2. Full height (U.N.O.), stainless steel 1½" x 1½"- "L" shaped

U. **Under Counter Waste Receptacle:** (**A22),** provide waste receptacle (at all restrooms with sinks) complying with the following:

1. Products: Available products include the following:

   a. Manufacturer: Bobrick Washroom Equipment, Inc.
   b. Product: Model B2260 – 13-gallon capacity, 22-inch-tall stainless steel; open top trash receptacle.

V. **Tens-A-Barrier:** (**A23),** provide complying with the following:

1. Products: Available products include the following:
   a. Manufacturer: Tensabarrier.
   b. Product: Model 896CM Concealed Wall Mini Mount.
2. Mounting: Surface mounted.
3. Exposed Material and Finish: Black and stainless steel, No. 4 finish (satin).

W. **Folding Shower Seat:** (**A24)**, provide folding shower seat (at all transfer showers) complying with the following:

1. Products: Available products include the following:
   a. Manufacturer: Bobrick
   b. Product: Model B5181
2. Configuration: L-shaped seat.
3. Mounting: Wall mounted.
4. Finish: Solid surface seat aluminum frame (brushed).
5. Blocking: Fire Treated Wood or Galvanized Steel (12 GA) blocking concealed within wall.
6. Mount at ht. required by ADA regulations and seal all through wall fasteners

X. **Shower Curtain and Rod:** (**A26)**

1. Products: Available products include the following:
   a. Manufacturer:
   b. Product: Model B-207; including opaque shower curtain and shower curtain hooks
2. Finish: Stainless steel (satin).

Y. **Recessed Soap Shelf: (A27)**

1. Products: Refer to the tile specifications
2. Provide 2 per shower

Z. **Purse Pouch:** (**A29),** provide sanitary napkin vendor (at all women's restrooms) complying with the following:

1. Products: Available products include the following:
   a. Manufacturer: Jacknob
   b. Product: model 110300
2. Concealed fasteners; stainless steel; mount near each toilet.

AA. **Hand Sanitizers:** (**A30)**

1. Provided by Owner installed by General Contractor to meet ADA requirements; align with top of light switch.

END OF SECTION 10801

SECTION 11132 – PROJECTION SCREENS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Electrically operated, ceiling recessed, front projection screens.

1.2 RELATED SECTIONS

A. Section 05500 - Metal Fabrications: Suspension systems for projection screens and / or projector lifts and mounts.

B. Section 09260 - Ceiling Suspension System: Supports and trim for suspended ceilings; Gypsum Board Assemblies: Ceiling for recessed screen installation.

1.3 ACTION SUBMITTALS

A. Submit under provisions of Section 01330 “Submittal procedures.”

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Wiring diagram for electrically operated units.

D. Shop Drawings: Shop drawings showing layout and types of projection screens. Show the following:
   1. Location of screen centerline.
   2. Location of wiring connections.
   3. Seams in viewing surfaces.
   4. Detailed drawings for concealed mounting.
   5. Connections to suspension systems.
   6. Anchorage details.
   7. Accessories.
   8. Frame details.

E. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

F. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain each type of projection screen required from a

single manufacturer as a complete unit, including necessary mounting hardware and accessories.

B. Coordination of Work: Coordinate layout and installation of projection screens with other construction supported by, or penetrating through, ceilings, including light fixtures, HVAC equipment, fire-suppression system, and partitions.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver projection screens until building is enclosed and other construction where screens will be installed is substantially complete.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Protect screens from damage during delivery, handling, storage, and installation.

1.6 COORDINATION

A. Coordinate work with installation of ceilings, walls, electric service power characteristics, and location.

1.7 CLOSEOUT SUBMITTALS

A. Refer to Section 01770 “Closeout Procedures.”

B. Maintenance data.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Manufacturer: Draper, Inc., or Architect approved equal, located at: 411 S. Pearl P. O. Box 425 ; Spiceland, IN 47385-0425; Toll Free Tel: 800-238-7999; Tel: 765-987-7999; Fax: 866-637-5611; Email: request info (drapercontract@draperinc.com); Web: www.draperinc.com

B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 MOTORIZED, CEILING RECESSED, FRONT PROJECTION SCREENS

A. Draper Signature/Series E: Electric motor operated, extruded aluminum case, independently motorized closure. Extruded aluminum case, finished white. UL approved "Suitable for use in environmental air space." Case size 9-3/4 inches (248 mm) deep and 9-1/8 inches (232 mm) wide for screen sizes through 144 inches wide; 11 inches (279 mm) x 9-1/8 inches (232 mm) for larger screen sizes. Bottom of case fully enclosed by aluminum panels and motorized aluminum trap door with

concealed hinges. Trap door supported entirely along front and back edges without crack around perimeter of door. Trap door opens into case when screen is lowered. Closure panels screw-attached to case and may be removed manually for access to roller and drive assembly. Case shall have white finish.

1. Motor mounted inside screen roller on rubber isolation insulators. Motor UL certified, rated 110-120V AC, 60 Hz, three wire, instantly reversible, lifetime lubricated with pre-set accessible limit switches. Motor with overload protection and electric brake.

2. Motor Screen Controls, UL certified.

    a. Low voltage control unit with three button 24V switches and cover plate to stop or reverse screen at any point. Provide @ 2 locations & coordinate with the projector lift controls; interface the controls to operate together with pre-set stop points for projector lift. Provide infrared wireless controller for remote operation.

3. Projection Viewing Surface:

    a. Matt white, washable surface. For use with any type projector where light can be controlled. GREENGUARD certified.

4. Viewing Area H x W.

    a. Video Format (16:10). Black masking borders standard.

        1) 137 inch diagonal, 72 ½” high x 116” wide.

5. Provide an extra screen drop with an overall screen drop of 12 inches with a black masking top border.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify rough-in openings are properly prepared.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for

achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install front projection screens with screen cases in position and relationship to adjoining construction as indicated, securely anchored to supporting substrate, and in manner that produces a smoothly operating screen with plumb and straight vertical edges and plumb and flat viewing surfaces when screen is lowered.

C. Test electrically operated units to verify that screen, controls, limit switches, closure and other operating components are in optimum functioning condition.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 11132

SECTION 11451 - APPLIANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Cooking appliances including:
    a. Microwave / Vent.

2. Refrigerator/freezers/refrigerators with ice maker and water dispenser.
3. Cleaning appliances:
    a. Disposal.
    b. Dishwasher.

B. Related Sections include the following:

1. Division 6 Section "Interior Architectural Woodwork" for custom-made cabinets and solid-surfacing-material countertops that receive appliances.
2. Division 15 and 16 Sections for services and connections to appliances.
3. Appendix B – Owner furnished furniture, fixtures, and equipment.

C. FBO warming and refrigerated cabinet appliances shall be provided by the Owner. Receiving, coordination, rough-in, hook-up and installation of the appliances shall be by the Contractor.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include operating characteristics, dimensions of individual appliances, and finishes for each appliance. Energy star rating where available. Shall be provided directly by the appliance manufacturer and not the installation contractor.

B. Appliance Schedule: For appliances; use same designations indicated on Drawings or Schedule as specified. Shall be provided directly by the appliance manufacturer and not the installation contractor.

C. Manufacturer Certificates: Signed by manufacturers certifying that products comply with requirements and are energy star compliant. Provide energy ratings where available and specified. Provide documentation for local utility rebate to be pursued by the Owner.

Product certifications shall be provided directly by the appliance manufacturer and not the installation contractor.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for each product. Product certifications shall be provided directly by the appliance manufacturer and not the installation contractor.

E. Maintenance Data: For each product to include in maintenance manuals. Product certifications shall be provided directly by the appliance manufacturer and not the installation contractor.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.

B. Product Options: Information on Drawings and in Specifications establishes requirements for product's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

C. Energy Ratings: Provide appliances that carry labels indicating energy-cost analysis (estimated annual operating costs) and efficiency information as required by the FTC Appliance Labeling Rule. Product certifications shall be provided directly by the appliance manufacturer and not the installation contractor.

D. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.5 WARRANTY

A. Special Warranties: Manufacturer's standard form in which manufacturer of each appliance specified agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.

1. Refrigerator/Freezer: Five-year limited warranty for in-home service on the sealed refrigeration system.

B. Warranties for products shall be provided directly by the appliance manufacturer and not the installation contractor.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Basis-of-Design Product: The design for each residential appliance is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 REFRIGERATION APPLIANCES

A. Refrigerator/Freezer:

1. Basis-of-Design Product: General Electric Company; Side-By-Side Refrigerator with Ice & Water Dispenser Model# GSS25LSL, energy star compliant, or a comparable product by one of the following:

a. Whirlpool

2. Provide valved water supply and connecting flexible piping to ice maker and chilled water.

B. Dishwasher:

1. Basis-of-Design Product: Bosch 300 Series – 18” Stainless Steel Dishwasher, or Architect and Owner approved equal.

C. Under Counter Refrigerator:

1. Basis-of-Design Product: U-Line; Model number 2224R-GL-INT-OOB, 2000 Series, under counter refrigerator with tempered glass door with integrated wood frame, 4.9 Cu. Ft., digital touch pad controls, (3) three adjustable tempered glass shelves and internal LED lighting.

2.3 CLEANING APPLIANCES

A. Disposal:

1. Basis-of-Design Product: General Electric Company; 3/4 Horsepower Continuous Feed Disposer Model# GFC720V:

a. Badger

b. Salvajor

2.4 COOKING APPLIANCES

A. Micro-wave (Counter Mounted &-Stacked- Units, as indicated on the drawings:

1. Basis-of-Design Product: General Electric Company; 2.2 CU. FT. Countertop Sensor Micro-Wave Oven PES7227SLSS:

B. Coffee Maker-By Owner

2.5 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Examine roughing-in for piping systems to verify actual locations of piping connections before equipment installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Comply with manufacturer's written instructions.

B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.

C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

D. Utilities: Refer to Divisions 15 and 16 for plumbing, mechanical, and electrical requirements.

3.3 CLEANING AND PROTECTION

A. Test each item of appliances to verify proper operation. Make necessary adjustments.

B. Verify that accessories required have been furnished and installed.

C. Remove packing material from appliances and leave units in clean condition, ready for operation.

3.4 DEMONSTRATION

A. The manufacturer shall provide a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain appliances. Refer to Division 1 Section "Demonstration and Training."

END OF SECTION 11451

SECTION 12481 – WALK OFF ENTRANCE GRILLE & MATTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Aluminum framed walk off grilles and carpeted matts at the entrances to the building.

1.3 REFERENCES

A. ASTM B 221-93 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
B. ASTM A 276-92 Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
C. AAMA 606.1 Voluntary Guide Specifications and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum
D. AAMA 607.1 Voluntary Guide Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.

1.4 COORDINATION

A. Coordinate size and location of recesses in concrete to receive floor grilles and frames.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details for horizontal louver blinds based on field verified window opening dimensions.

C. Samples for Verification: For each type and color of horizontal louver blind indicated.

1. Color samples; 12’ x 12”.

2. Perimeter trim samples and grille samples; 12” x 12”.

D. Product Certificates: For each type of grille or matt, signed by product manufacturer.

E. Maintenance Data: For grilles and matts to include in maintenance instructions.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain grilles and matts through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide horizontal louver blinds with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Flame-Resistance Ratings: Passes NFPA 701.

C. Product Standard: Provide horizontal louver blinds complying with WCSC A 100.1.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver horizontal louver blinds in factory packages, marked with manufacturer and product name, lead-free designation, and location of installation using same designations indicated on Drawings and in a window treatment schedule.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not grille and matts until construction and wet and dirty finish work in spaces, including painting, is complete. For interior matts finishes and exterior work should be completed, and the building should be dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where grilles and matts are indicated to be recessed and fit to other construction, verify dimensions of other construction by field measurement and layout confirmation before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.9 FIELD CONDITIONS

A. Field Measurements: Indicate measurements on Shop Drawings.

1.10 WARRANTY

A. Provide manufacturer's written warranty.

B. Warrant materials and fabrication against defects after completion and final acceptance of Work.

C. Repair defects, or replace with new materials, faulty materials or fabrication developed during the warranty period at no expense to Owner.

PART 2 - PRODUCTS

2.1 Accessibility Standard:

A. Comply with applicable provisions in [the DOJ's "2010 ADA Standards for Accessible Design"] [and] [ICC A117.1] <Insert regulation>.

2.2 ACCEPTABLE MANUFACTURERS

A. Rigid Floor Grille: 100 percent recycled, nylon-reinforced, buffed-carpet tread strips, alternating with mill finish aluminum divider-bars, 3/4 inches high, with perimeter aluminum trim square edge trim angle, and rubber edge strip at both edges in path of travel,. Model number RGR34. Manufactures full range of color selection.

1. Basis-of-Design Product: American Floor Matts; www. Americanflormatts.com, or Architect approved equal.
2. Rolling Load: 1000 lb. per wheel.
3. Tread Inserts: 100 percent recycled, nylon-reinforced buffed rubber with minimum 59 percent postconsumer and 22 percent pre-consumer recycled content, mechanically secured to tread rails.
4. Colors, Textures, and Patterns of Inserts: Manufacture’s full color range.
5. Rail Color: Mill finish aluminum.

B. Floor Matts: American Floor Matts RCRDGRM, or Architect approved equal, 9/16-inch-thick, Specialized Nylon Roll Goods: 100 percent Premium Polyamide Nylon Fiber (6.6) with Polypropylene base grid as follows:

1. Carpet Ridge: 9/16-inch-thick with high density anti-slip rubber backing, 103 oz/sq.yd. Color to be selected from manufacture’s full range of colors selected by the Architect from full range of manufacture’s colors.

2.. Options & Accessories:

a. Ultra Flex Premium Sewn-on Nosing

b. Adhesive for Mounting: Multi-Bond Adhesive as recommended by manufacturer

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install grilles and matts level and flush with adjoining surfaces according to manufacturer's written instructions; level substrate as required to ensure that there is no lippage at the perimeter of the grille or mat.

3.3 ADJUSTING & CLEANING

A. Adjust top surface of assembly to be flush with adjacent finishes.

B. Coordinate top of surfaces with doors that swing across surface to provide adequate under door clearance.

C. Clean dirt and debris from frame recess before installing floor system.

3.4 PROTECTION & REPAIR

A. Replace materials that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion

B. Upon completion of frame installations, provide temporary filler of plywood or fiberboard in grille recesses, and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near time of Substantial Completion.

C. Install product when no further wheeled construction traffic will occur and wet type operations including painting and decorating are com

END OF SECTION 12481

SECTION 12491 - HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Horizontal louver blinds with aluminum slats to match the Airport Administration Office, the Lobby store front windows will not need blinds.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details for horizontal louver blinds based on field verified window opening dimensions.

C. Samples for Verification: For each type and color of horizontal louver blind indicated.

1. Slat: Not less than 12 inches long, color to be selected by Architect from manufacturers full range of colors and finishes.

2. Color samples.

D. Window Treatment Schedule: For horizontal louver blinds. Use same designations indicated on Drawings.

E. Product Certificates: For each type of horizontal louver blind, signed by product manufacturer.

F. Maintenance Data: For horizontal louver blinds to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain horizontal louver blinds through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide horizontal louver blinds with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to

authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Flame-Resistance Ratings: Passes NFPA 701.

C. Product Standard: Provide horizontal louver blinds complying with WCSC A 100.1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver horizontal louver blinds in factory packages, marked with manufacturer and product name, lead-free designation, and location of installation using same designations indicated on Drawings and in a window treatment schedule.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet and dirty finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Horizontal Louver Blinds: Before installation begins, for each size, color, texture, pattern, and gloss indicated, full-size units equal to 5 percent of amount installed, but no fewer than 4 units.

PART 2 - PRODUCTS

2.1 HORIZONTAL LOUVER BLINDS, ALUMINUM SLATS

A. Products: Subject to compliance with requirements, provide one of the following:

1. Hunter Douglas; Décor.
2. Levolor, a Newell Rubbermaid Company; Riviera.
3. Springs Window Fashions Division, Inc.; Graber; Performance Series.

B. Slats: Aluminum; alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radiused corners.

1. Width: 1 inch.

a. Spacing: Manufacturers Standard.

2. Thickness: Manufacturer's standard.
3. Finish: One color.

a. Ionized Coating: Antistatic, dust-repellent, baked polyester finish.

C. Headrail: Formed steel or extruded aluminum; long edges returned or rolled; fully enclosing operating mechanisms on three sides and end plugs and the following:

1. Capacity: One blind per headrail.
2. Light-blocking lower back lip.

D. Bottom Rail: Formed-steel or extruded-aluminum tube, with plastic or metal capped ends top contoured to match crowned shape of slat and bottom contoured for minimizing light gaps; with enclosed ladders and tapes to prevent contact with sill.

E. Ladders: Evenly spaced to prevent long-term slat sag.

1. For Blinds with Nominal Slat Width 1 Inch or Less: Braided string.

F. Lift Cords: Manufacturer's standard.

G. Tilt Control: Enclosed worm-gear mechanism, slip clutch or detachable wand preventing overrotation, and linkage rod, and the following:

1. Tilt Operation: Manual with clear plastic wand.
2. Length of Tilt Control: Length required to make operation convenient from floor level.
3. Tilt: Full.

H. Lift Operation: Manual, top-locking cord lock; locks pull cord to stop blind in either fully opened or fully closed position only and is equipped with a ring pull not more than 4 inches long.

I. Valance: Two slats.

1. Finish Color Characteristics: Match color, texture, pattern, and gloss of slats.

J. Mounting: Ceiling mounting, permitting easy removal and replacement without damaging blind or adjacent surfaces and finishes; with spacers and shims required for blind placement and alignment indicated.

1. Provide intermediate support brackets if end support spacing exceeds spacing recommended by manufacturer for weight and size of blind.

K. Colors, Textures, Patterns, and Gloss: As selected by Architect from manufacturer's full range.

2.2 HORIZONTAL LOUVER BLIND FABRICATION

A. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.

1. Lift-and-Tilt Mechanisms: With permanently lubricated moving parts.

B. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F :

1. Blind Units Installed outside Jambs: Width and length as indicated, with terminations between blinds of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.

C. Installation Brackets: Designed for easy removal and reinstallation of blind, for supporting headrail, valance, and operating hardware, and for hardware position and blind mounting method indicated.

D. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to blind hardware and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.

E. Color-Coated Finish:

1. Metal: For components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

F. Component Color: Provide rails, cords, ladders, and exposed-to-view metal and plastic matching or coordinating with slat color, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install horizontal louver blinds level and plumb and aligned with adjacent units according to manufacturer's written instructions, and located so exterior slat edges in any position are not closer than 2 inches to interior face of glass. Install intermediate support as required to prevent deflection in headrail. Allow clearances between adjacent blinds and for operating glazed opening's operation hardware if any.

B. Head Mounted: Install headrail on face of opening head.

3.3 ADJUSTING

A. Adjust horizontal louver blinds to operate smoothly, easily, safely, and free of binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

A. Clean horizontal louver blind surfaces after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.

C. Replace damaged horizontal louver blinds that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 12491

SECTION 12615 – PUBLIC SEATING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes Lounge Chair Seating with side tables; SYNK2 with side tables including power and USB charging stations for airport terminals, as the Basis of Design. The seating for this project will be provided as part of an allowance.

1.3 RELATED SECTIONS

A. Division 09680 Carpet for coordination and sequencing of work. Division 16 Electrical for wiring and connection of power charging stations.

1.4 SUBMITTALS

A. Product Data: For each seating module and table module indicated, and power poles for charging stations.

B. Installation Drawings: Layout plans and system details showing seating layout, chair widths, table widths and locations.

C. Samples: Prepare samples from the same material to be used for the work.

D. Maintenance data.

E. Graphics for power pole – charging stations.

1.5 QUALITY ASSURANCE

A. Upholstery Vinyl Source Limitations: Obtain vinyl of a single dye lot for each color required.

B. Bidder Qualifications: The successful bidder shall be authorized to distribute the specified seating. These dealerships shall be contractually committed to meet the manufacture’s quality standards both in distribution and installation services.

C. The authorized dealer must have written evidence to support the mutually agreed upon Dealer Agreement. This agreement contains both dealer and manufacturer

obligations for servicing and installation. Dealers are also required to maintain a reputation for high quality service, consultative selling, and business integrity and to render prompt and courteous service with respect to every product in this contract.

D. Selected dealer shall provide an installation staff authorized to install, service and provide expertise to manage the warranties associated with the specified seating product.

1.6 WARRANTY

A. General Warranty: Provide manufacturers standard warranty against defects in materials and workmanship for a period as specified below. Any defects or failure, expecting ordinary wear and tear, shall be repaired or replaced by the Manufacturer and or Dealership promptly upon receipt of written notice from the Owner. Warranty shall cover all shipping, taxes, materials and labor.

1. Warranty Period
   a. Upholstery: 12 years from date of manufacture
   b. Frame 12 years from date of manufacture
   c. Arms: 12 years from date of manufacture
   d. Tables 12 years from date of manufacture

1.7 SUBMITTALS

A. Samples of all fabric, hardware, metal and laminate for verification and acceptance of the materials to be provided.

B. Seating layout showing existing chairs and tables, new chairs and tables for the Lobby area. The chairs shall be installed after finish is completed.

PART 2 – PRODUCTS

2.1 PUBLIC SEATING

A. Basis of Design – Lounge Chair Synk2 with custom laminate side tables including power and USB charging stations at the fac of the side table.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install seats and tables level and plumb-ganged seats must be assembled at the factory.

B. Repair minor abrasions and imperfections in finishes as suggested by manufactured instructions.

C. Replace seat and back vinyl damaged during installation. Do not use Owner's extra materials, stock for replacement of damaged vinyl during installation, unless directed by Owner or their agent.

D. Remove all trash, shipping containers, etc. from project site and dispose of properly.

E. Vacuum floor, and wipe clean the areas with seating after installation. Repair floor, wall, or ceiling finishes, if damaged during installation.

F. Coordinate with the Contractor's schedule and the project phasing requirements for both permanent and temporary seating arrangements.

3.2 TESTING

A. The seating module must pass the following ANSI/BIFMA tests:

1. X5.4-1983, 17 test for leg strength which calls for a 75-pound functional load and 125-pound proof load.
2. X5.4-1983, 5 test for horizontal back strength, which calls for a 150-pound functional load and a 250-pound proof load.
3. X5.4-1983, 16 test for base loading, which calls for 2,500 pounds applied twice.
4. X5.4-1983, 18 test for unit drop, which calls for three 12-inch drops and one 24-inch drop.
5. X5.4-1983, 15 test for structural durability, which calls for 100,000 cycle.

B. The seating module must pass the following additional tests:

1. Arm loading test that passes 50,000 cycles of 200.
2. Impact test that passes 200-pound, 112-inch drop impact with a 1/8" permanent set maximum allowable performance requirement.
3. Humidity shock test.
4. Swinging impact chair backs test with 100,000 cycles of 105-pound load at 7" impact with no affect.
5. Attachment strength of chair fasteners test with a 600-pound performance requirement.

END OF SECTION 12615

SECTION 12931 – BICYCLE BOLLARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Provisions and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Bicycle post bollard.

B. Related Sections include the following:

1. Division 3 Section "Cast-In-Place Concrete."
2. Division 5 Section "Metal Fabrications."

1.3 - REFERENCES

A. American Society for Testing and Materials ASTM A 513 – Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.

B. American Society for Testing and Materials ASTM A 500B – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

1.4 - SUBMITTALS

A. Manufacturer’s data sheets on each product to be used, included:
   1. Preparation instructions and recommendations.
   2. Maintenance requirements and recommendations.

B. Shop Drawings: Manufacturing details, dimensions, and mounting for each bicycle bollard post(s).

1.5 – QUALITY ASSURANCE

A. Manufacturer’s Qualifications:
   1. A firm experienced in manufacturing bicycle bollard post(s) similar to those required for this project and with a record of successful in-service performance.

B. Installer Qualifications:
   1. An experienced installer who has completed installation of bicycle bollard post(s) similar in material, design, and extent to that indicated for this project

and whose work has resulted in construction with a record of successful in-service performance.

C. Source Limitations: Obtain each color, finish, shape and type of bicycle bollard post(s) (if multiple posts are required) from a single source with resources to provide components of consistent quality in appearance and physical properties.

1.6 – DEILVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 – PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

2.1 - MANUFACTURERS

A. Contractor will select manufacturers known for producing quality bicycle bollard post(s).
B. The basis of design for the bicycle post shall be Model BKR-35 as manufactured by Victor Stanley, Inc. 1-800-368-2573.

1. 3" outside diameter tube steel bollard.
2. In-ground mounted.
3. TGIC polyester powder coatings.

2.4 - MATERIALS

A. Steel Tube: ASTM A 513, electric welded steel tubing.

B. Steel Pipe: ASTM A 500B steel pipe.

2.5 - FINISH

A. Manufacturer's standard factory applied polyester paint finishes using a powder coating heat cured system. Color as approved by the Architect.

1. All fabricated components shall be shotblasted, etched, phosphatized,

preheated, and electrostatically powder-coated with TGIC polyester powder coatings.
2. Products shall be fully cleaned and pretreated, preheated and coated while hot to fill crevices and build coating film.
3. Coated parts shall fully cure to coating manufacturer's specifications.
4. Thickness of the finish coat shall be 8-10 mils.

B. Manufacturer's standard hot dipped galvanized steel finish.

1. Prior to powder coating, components shall receive hot dipped galvanizing.
2. Galvanizing of lids shall be as per manufacturer's standard process.

C. Coat all embedded metal components (concealed) with bituminous coating.

PART 3 - EXECUTION

3.1 - EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 - INSTALLATION

A. Bicycle bollard post(s) shall be securely set into a thickened footing isolated from the pad and sidewalk.

B. Concrete Foundation & Pad

1. Material: Portland Cement Concrete

2. Curing: See 201 FDOT Specification 520-8

3. Strength: 2,500 psi @ 28 days

4. Finish: Concealed below sidewalk; not applicable

5. Dimensions: The thickened footing shall be 33 inches deep minimum, and 14 inch diameter and set below the bottom face of side walk. Use sonotube for casting the footing; and, provide an isolation joint around the bollard. The dimensions & thickness of the bicycle parking area pad shall be per the Drawings.

3.3 - PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion

END OF SECTION 12931

SECTION 13341 - METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes metal building systems that consist of integrated sets of mutually dependent components including structural framing, roof panels, wall panels, soffit panels, doors and accessories.

B. Related Sections include the following:

1. Division 3 Section "Cast-in-Place Concrete" for concrete foundations, slabs, and anchor-bolt installation.
2. Division 7 Section "Building Insulation" for insulation installed in metal roof and wall panel assemblies, “Caulking and Sealants”, and “Metal Wall Panels”.
3. Division 8 Section for “Metal Doors and Frames” and “Overhead Ceiling Doors”
4. Division 9 painting Sections for finish painting of shop-primed structural framing and “Gypsum Board Assemblies”.
5. Division 10 Section for “Louvers and Dampers”.

1.3 DEFINITIONS

A. Bay: Dimension between main frames measured normal to frame (at centerline of frame) for interior bays, and dimension from centerline of first interior main frame measured normal to end wall (outside face of end-wall girt) for end bays.

B. Building Length: Dimension of the building measured perpendicular to main framing from end wall to end wall (outside face of girt to outside face of girt).

C. Building Width: Dimension of the building measured parallel to main framing from sidewall to sidewall (outside face of girt to outside face of girt).

D. Clear Span: Distance between supports of beams, girders, or trusses (measured from lowest level of connecting area of a column and a rafter frame or knee).

E. Eave Height: Vertical dimension from finished floor to eave (the line along the sidewall formed by intersection of the planes of the roof and wall).

F. Clear Height under Structure: Vertical dimension from finished floor to lowest point of any part of primary or secondary structure, not including crane supports, located within clear span.

G. Terminology Standard: Refer to MBMA's "Metal Building Systems Manual" for definitions of terms for metal building system construction not otherwise defined in this Section or in referenced standards.

1.4 SYSTEM DESCRIPTION

A. General: Provide a complete engineered, integrated set of metal building system manufacturer's standard mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior. Include primary and secondary framing, metal roof panels, metal wall panels, and accessories complying with requirements indicated.

1. Provide metal building system of size and with spacing's, slopes, and spans indicated.

2. Provide metal framing of size and spacing's, spans required for hangar door assembly and installation.

3. Provide sub framing and blocking required for door, window louvers, signage or other exterior mounted building components.

B. Primary Frame Type:

1. Rigid Clear Span: Solid-member, structural-framing system without interior columns.

C. End-Wall Framing: Provide primary frame, capable of supporting full-bay design loads, and end-wall columns.

D. Secondary Frame Type: Manufacturer's standard purlins and joists and exterior-framed (bypass) girts.

E. Eave Height: Manufacturer's standard height, as indicated by nominal height on Drawings. Manufacturer's standard spacing, as indicated.

F. Bay Spacing: By nominal bay spacing on drawings.

G. Roof Slope: 1 inch per 12 inches, U.O.N.

H. Roof System: Manufacturer's standard vertical-rib, standing-seam metal roof panels.

I. Exterior Wall System: Manufacturer's standard field-assembled, metal wall panels, with filed installed insulation.

1.5 SYSTEM PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal building systems capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Engineer metal building systems according to procedures in MBMA's "Metal Building Systems Manual."
2. Design Loads: As required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures." And the Florida Building Code latest edition in effect and the local Authorities Having Jurisdiction.
3. Live Loads: Include vertical loads induced by the building occupancy indicated on Drawings. Include loads induced by maintenance workers, materials, and equipment for roof live loads.

    a. Building Occupancy: As indicated on drawings.
4. Wind Loads: Include horizontal loads induced by a basic wind speed corresponding to a 50-year, mean-recurrence interval at Project site.
5. Collateral Loads: Include additional dead loads other than the weight of metal building system for permanent items such as sprinklers, mechanical systems, electrical systems, and ceilings, minimum 7 pounds per square foot.
6. Auxiliary Loads: Include dynamic live loads, such as those generated by cranes and materials-handling equipment indicated on Drawings.
7. Load Combinations: Design metal building systems to withstand the most critical effects of load factors and load combinations as required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures." And with the 2006 International Building Code.
8. Deflection Limits: Engineer assemblies to withstand design loads with deflections no greater than the following:

    a. Purlins and Rafters: Vertical deflection of 1/180 of the span.
    b. Girts: Horizontal deflection of 1/240 of the span.
    c. Metal Roof Panels: Vertical deflection of 1/180 of the span.
    d. Metal Wall Panels: Horizontal deflection of 1/240 of the span.

9. Design secondary framing system to accommodate deflection of primary building structure and construction tolerances, and to maintain clearances at openings.
10. Provide metal panel assemblies capable of withstanding the effects of loads and stresses indicated, based on testing according to ASTM E 1592.

B. Thermal Movements: Provide metal panel systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

C. Air Infiltration for Metal Roof Panels: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of roof area when tested according to ASTM E 1680 at negative test-pressure difference of 1.57 lbf/sq. ft..

D. Air Infiltration for Metal Wall Panels: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of wall area when tested according to ASTM E 283 at static-air-pressure difference of 6.24 lbf/sq. ft..

E. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E 1646 at test-pressure difference of 2.86 lbf/sq. ft..

F. Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E 331 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft..

G. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for Class 90.

1.6 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of the following metal building system components:

1. Structural-framing system and engineered bracing and erection drawings.
2. Metal roof panels.
3. Metal wall panels .
4. Insulation and vapor retarders.
5. Flashing and trim.
6. Doors.
7. Accessories.
8. Windows.
9. Louvers.
10. Florida Product Approval Certifications for exterior building elements, if required by Authorities Having Jurisdiction.

B. Shop Drawings: For the following metal building system components. Include plans, elevations, sections, details, and attachments to other work.

1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation, licensed in the State of the metal building installation.
2. Anchor-Bolt Plans: Submit anchor-bolt plans before foundation work begins. Include location, diameter, and projection of anchor bolts required to attach metal building to foundation. Indicate column reactions at each location.
3. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.

4. Metal Roof and Wall Panel Layout Drawings: Show layouts of metal panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.

    a. Show roof-mounted items including equipment supports, pipe supports and penetrations, lighting fixtures, skylights, roof vents, and items mounted on roof curbs.
    b. Show wall-mounted items including doors, louvers, and lighting fixtures.
    c. Show translucent panels.

5. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:

    a. Flashing and trim.
    b. Gutters.
    c. Downspouts.
    d. Roof ventilators.
    e. Louvers.
    f. Service walkways.
    g. Windows and doors.

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of sizes indicated below.

1. Metal Roof and Wall Panels: Nominal 12 inches long by actual panel width. Include fasteners, closures, and other exposed panel accessories.

D. Product Certificates: For each type of metal building system, signed by product manufacturer.

1. Letter of Design Certification: Signed and sealed by a qualified professional engineer licensed in the State of the metal building installation. Include the following:

    a. Name and location of Project.
    b. Order number.
    c. Name of manufacturer.
    d. Name of Contractor.
    e. Building dimensions including width, length, height, and roof slope.
    f. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
    g. Governing building code and year of edition.
    h. Design Loads: Include dead load, roof live load, collateral loads, deflection, wind loads/speeds and exposure and auxiliary loads (cranes).
    i. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
    j. Building-Use Category: Indicate category of building use and its effect on load importance factors.

k. AISC Certification for Category MB: Include statement that metal building system and components were designed and produced in an AISC-Certified Facility by an AISC-Certified Manufacturer.

E. Welding certificates.

F. Erector Certificate: Signed by manufacturer certifying that erector complies with requirements.

G. Manufacturer Certificate: Signed by manufacturer certifying that products comply with requirements.

H. Qualification Data: For Erector manufacturer professional engineer.

I. Material Test Reports: Signed by manufacturers certifying that the following products comply with requirements:

1. Structural steel including chemical and physical properties.
2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
3. Tension-control, high-strength, bolt-nut-washer assemblies.
4. Shop primers.
5. Non-shrink grout.

J. Source quality-control test reports.

K. Field quality-control test reports.

L. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for insulation and vapor retarders. Include reports for thermal resistance, fire-test-response characteristics, water-vapor transmission, and water absorption.

M. Maintenance Data: For metal panel finishes and door hardware to include in maintenance manuals.

N. Warranties: Special warranties specified in this Section.

O. Other Action Submittals:

1. Door Schedule: For doors and frames. Use same designations indicated on Drawings. Include details of reinforcement.

a. Door Hardware Schedule: Include details of fabrication and assembly of door hardware. Organize schedule into door hardware sets indicating complete designations of every item required for each door or opening.
b. Keying Schedule: Detail Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

2. Refer to Section “Metal Doors and Frames” for specific project requirements.

1.7 QUALITY ASSURANCE

A. Erector Qualifications: An experienced erector who has specialized in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.

B. Manufacturer Qualifications: A qualified manufacturer and member of MBMA.

1. AISC Certification for Category MB: An AISC-Certified Manufacturer that designs and produces metal building systems and components in an AISC-Certified Facility.
2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

C. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated, as documented according to ASTM E 548.

D. Source Limitations: Obtain primary metal building system components, including structural framing and metal panel assemblies, through one source from a single manufacturer.

E. Product Options: Drawings indicate size, profiles, and dimensional requirements of metal building system and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

F. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

G. Structural Steel: Comply with AISC's "Specification for Structural Steel Buildings--Allowable Stress Design, Plastic Design," or AISC's "Load and Resistance Factor Design Specification for Structural Steel Buildings," for design requirements and allowable stresses.

H. Cold-Formed Steel: Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members," or AISI's "Load and Resistance Factor Design Specification for Steel Structural Members," for design requirements and allowable stresses.

I. Fire-Resistance Ratings: Where indicated, provide metal panel assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Combustion Characteristics: ASTM E 136.
2. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
3. Metal panels shall be identified with appropriate markings of applicable testing and inspecting agency.

J. Surface-Burning Characteristics: Provide field-insulated metal panels having thermal insulation and vapor-retarder-facing materials with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Flame-Spread Index: 25 or less, unless otherwise indicated.
2. Smoke-Developed Index: 450 or less, unless otherwise indicated.

K. Pre-Erection Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to metal building systems including, but not limited to, the following:

1. Inspect and discuss condition of foundations and other preparatory work performed by other trades.
2. Review structural load limitations.
3. Review and finalize construction schedule and verify availability of materials, Erector's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review required testing, inspecting, and certifying procedures.
5. Review weather and forecasted weather conditions and procedures for unfavorable conditions.

L. Pre-installation Roof Assembly Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:

1. Examine purlin and rafter conditions for compliance with requirements, including flatness and attachment to structural members.
2. Review structural limitations of purlins and rafters during and after roofing.
3. Review flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
4. Review temporary protection requirements for metal roof panel assembly during and after installation.
5. Review roof observation and repair procedures after metal roof panel installation.

M. Pre-installation Wall Assembly Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:

1. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
2. Review structural limitations of girts and columns during and after wall panel installation.
3. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
4. Review temporary protection requirements for metal wall panel assembly during and after installation.

5. Review wall observation and repair procedures after metal wall panel installation.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness and with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

1.9 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements:

1. Established Dimensions for Foundations: Comply with established dimensions on approved anchor-bolt plans, establishing foundation dimensions and proceeding with fabricating structural framing without field measurements. Coordinate anchor-bolt installation to ensure that actual anchorage dimensions correspond to established dimensions.
2. Established Dimensions for Metal Panels: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating metal panels without field measurements, or allow for field trimming metal panels. Coordinate construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.10 COORDINATION

A. Coordinate size and location of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete."

B. Coordinate installation of roof curbs equipment supports and roof penetrations, per the drawings or scheduled or scheduled or specified elsewhere.

C. Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leak-proof, secure, and noncorrosive installation.

1.11 WARRANTY

A. Special Warranty on Metal Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam, metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

3. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Buildings Company.
2. Butler Manufacturing Company.
3. Ceco Building Systems; Division of Robertson-Ceco Corporation.
4. Gulf States Manufacturers, Inc.
5. Metallic Metal Building Company; Division of NCI Building Systems, LLP.
6. VP Buildings, Inc.; a United Dominion Company.
7. Nucor Building Systems Group.
8. Chief Buildings.
9. OSI Building Systems.

2.2 STRUCTURAL-FRAMING MATERIALS

A. W-Shapes: ASTM A 992/A 992M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.

B. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36/A 36M; Grade 50 or 55.

C. Plate and Bar: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55.

D. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.

E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B or C, structural tubing.

F. Structural-Steel Sheet: Hot-rolled, ASTM A 1011/A 1011M, Structural Steel (SS), Grades 30 through 55.

G. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grades 33 through 80 with G60 coating designation; mill phosphatized. Retain paragraph and subparagraphs below for secondary framing if required.

H. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grades 33 through 80 or High-Strength Low Alloy Steel (HSLAS), Grades 50 through 80; with G90 coating designation.

I. Non-High-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A, carbon-steel, hex-head bolts; ASTM A 563 carbon-steel hex nuts; and ASTM F 844 plain (flat) steel washers.

1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

J. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
2. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex-head steel structural bolts with splined ends.

a. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50, baked epoxy coated.

K. Unheaded Anchor Rods: ASTM F 1554, Grade 36.

1. Configuration: Straight.
2. Nuts: ASTM A 563 heavy hex carbon steel.
3. Plate Washers: ASTM A 36/A 36M carbon steel.
4. Washers: ASTM F 436 hardened carbon steel.
5. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

L. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.

1. Nuts: ASTM A 563 heavy hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436 hardened carbon steel.
4. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

M. Threaded Rods: ASTM A 193/A 193M.

1. Nuts: ASTM A 563 heavy hex carbon steel.
2. Washers: ASTM F 436 hardened carbon steel.
3. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

N. Primer: SSPC-Paint 15, Type I, red oxide.

2.3 MATERIALS FOR FIELD-ASSEMBLED METAL PANELS

A. Metallic-Coated Steel Sheet Pre-painted with Coil Coating: Steel sheet metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grades 33 through 80, with G90 coating designation.
2. Surface: Smooth, flat finish.
3. Exposed Finishes: Apply the following coil coating, as specified or indicated on Drawings:

a. High-Performance Organic Finish (2-Coat Fluoropolymer-70% PVDF): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions, except as modified below:

1) Humidity Resistance: 1000 hours.
2) Salt-Spray Resistance: 1000 hours.

b. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored backer finish, consisting of prime coat and wash coat with a total minimum dry film thickness of 0.5 mil.

B. Refer to specification Section 07421 Metal Wall Panels for additional information; the metal panels shall be horizontal ribbed panels, with concealed fasteners.

2.4 THERMAL INSULATION FOR FIELD-ASSEMBLED METAL PANELS

A. Metal Building Insulation: ASTM C 991, Type I, or NAIMA 202, glass-fiber-blanket insulation; 0.5-lb/cu. ft. density; 2-inch- wide, continuous, vapor-tight edge tabs; and with a flame-spread index of 25 or less.

B. Vapor-Retarder Facing: ASTM C 1136, with permeance not greater than 0.02 perm when tested according to ASTM E 96, Desiccant Method.

1. Composition: White polypropylene film facing and fiberglass-polyester blend fabric backing.

C. Retainer Strips: 0.019-inch- thick, formed, galvanized steel or PVC retainer clips colored to match insulation facing.

D. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

E. Refer to Section “Building Insulation” for additional requirements.

2.5 DOOR AND FRAME MATERIALS

A. Refer to Section “Metal Door and Frames” for exterior door requirement and Section “Overhead Ceiling Doors“ for roll up doors.

2.6 MISCELLANEOUS MATERIALS

A. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of plastic caps or factory-applied coating.

1. Fasteners for Metal Roof and Wall Panels: Self-drilling Type 410 stainless-steel or self-tapping Type 304 stainless-steel or zinc-alloy-steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of metal panels.
2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.

B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

C. Gypsum Board: Refer to Section “Gypsum Board Assemblies” for gypsum board requirements. All gypsum board to be 5/8” thick minimum.

D. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

E. Metal Panel Sealants:

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray poly-isobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape of manufacturer's standard size.
2. Joint Sealant: ASTM C 920; one-part elastomeric polyurethane, polysulfide, or silicone-rubber sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weather tight; and as recommended by metal building system manufacturer.

3. Refer to Section “Caulking and Sealants” for additional submittal and product requirements.

2.7 FABRICATION, GENERAL

A. General: Design components and field connections required for erection to permit easy assembly.

1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.

B. Tolerances: Comply with MBMA's "Metal Building Systems Manual": Chapter IV, Section 9, "Fabrication and Erection Tolerances."

C. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

2.8 STRUCTURAL FRAMING

A. General:

1. Primary Framing: Shop fabricate framing components to indicated size and section with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.

    a. Make shop connections by welding or by using high-strength bolts.
    b. Join flanges to webs of built-up members by a continuous submerged arc-welding process.
    c. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
    d. Weld clips to frames for attaching secondary framing members.
    e. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary structural members with specified primer after fabrication.

2. Secondary Framing: Shop fabricate framing components to indicated size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form,

punch, drill, and weld secondary framing for bolted field connections to primary framing.

a. Make shop connections by welding or by using non-high-strength bolts.
b. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary structural members with specified primer after fabrication.

B. Primary Framing: Manufacturer's standard structural primary framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafter, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.

1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.

a. Slight variations in span and spacing may be acceptable if necessary to meet manufacturer's standard, as approved by Architect.

2. Rigid Clear-Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
3. Frame Configuration: Single gable.
4. Exterior Column Type: Tapered.
5. Rafter Type: Tapered.

C. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:

1. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural-steel sheet; with minimum thickness of 0.0598 inch.
2. End-Wall Rafters: C-shaped, cold-formed, structural-steel sheet; with minimum thickness of 0.0598 inch; or I-shaped sections fabricated from shop-welded, built-up steel plates or structural-steel shapes.

D. Secondary Framing: Manufacturer's standard secondary framing members, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Fabricate framing from cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet pre-painted with coil coating, unless otherwise indicated, to comply with the following:

1. Purlins: C- or Z-shaped sections; fabricated from minimum 0.0598-inch- thick steel sheet, built-up steel plates, or structural-steel shapes; minimum 2-1/2-inch- wide flanges.
2. Girts: C- or Z-shaped sections; fabricated from minimum 0.0598-inch- thick steel sheet, built-up steel plates, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees to flange and with minimum 2-1/2-inch- wide flanges.

3. Eave Struts: Unequal-flange, C-shaped sections; fabricated from 0.0598-inch- thick steel sheet, built-up steel plates, or structural-steel shapes; to provide adequate backup for metal panels.
4. Flange Bracing: Minimum 2-by-2-by-1/8-inch structural-steel angles or 1-inch diameter, cold-formed structural tubing to stiffen primary frame flanges.
5. Sag Bracing: Minimum 1-by-1-by-1/8-inch structural-steel angles.
6. Base or Sill Angles: Minimum 3-by-2-by-0.0598-inch zinc-coated (galvanized) steel sheet.
7. Purlin and Girt Clips: Minimum 0.0598-inch- thick, steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.
8. Secondary End-Wall Framing: Manufacturer's standard sections fabricated from minimum 0.0598-inch- thick, zinc-coated (galvanized) steel sheet.
9. Framing for Openings: Channel shapes; fabricated from minimum 0.0598-inch- thick, cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings, and head, jamb, and sill of other openings.
10. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.

E. Canopy and Lean to Framing: Manufacturer's standard structural-framing system, designed to withstand required loads, fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide frames with attachment plates and splice members, factory drilled for field-bolted assembly.

1. Type: As indicated.

F. Bracing: Provide adjustable wind bracing as follows:

1. Rods: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50; or ASTM A 529/A 529M, Grade 50; minimum 1/2-inch- diameter steel; threaded full length or threaded a minimum of 6 inches at each end.
2. Cable: ASTM A 475, 1/4-inch- diameter, extra-high-strength grade, Class B zinc-coated, 7-strand steel; with threaded end anchors.
3. Angles: Fabricated from structural-steel shapes to match primary framing, of size required to withstand design loads.
4. Rigid Portal Frames: Fabricate from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
5. Fixed-Base Columns: Fabricate from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
6. Bracing: Provide wind bracing using any method specified above, at manufacturer's option.

G. Bolts: Provide plain finish bolts for structural-framing components that are primed or finish painted. Provide hot-dipped galvanized bolts for structural-framing components that are galvanized.

H. Factory-Primed Finish: Apply specified primer immediately after cleaning and pretreating.

1. Prime primary, secondary, and end-wall structural-framing members to a minimum dry film thickness of 1 mil.

a. Prime secondary steel framing formed from uncoated steel sheet to a minimum dry film thickness of 0.5 mil on each side.

2.9 METAL ROOF PANELS

A. Trapezoidal-Rib, Standing-Seam Metal Roof Panels: Formed with raised trapezoidal ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels. Exposed metal fasteners for roof panels will not be acceptable.

1. Material: Zinc-coated (galvanized) steel sheet, 0.0269 inch thick.

a. Exterior Finish: Fluoropolymer.
b. Color: As selected by Architect from manufacturer's full range. Color to match existing adjacent metal buildings.

2. Clips: Manufacturer's standard, floating type to accommodate thermal movement; fabricated from zinc-coated (galvanized) steel sheet.
3. Joint Type: Mechanically seamed, folded as standard with manufacturer.
4. Panel Coverage: 24 inches.
5. Panel Height: 3 inches.
6. Uplift Rating: UL 90.

2.10 FIELD-ASSEMBLED METAL WALL PANELS

A. Tapered-Rib-Profile, Exposed-Fastener Metal Wall Panels: Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs; designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Horizontal ribbed metal panels shall match the GA Terminal Building, refer to specification section 07421 Metal Wall Panels for additional information. The metal panels at the back of the parapet, concealed from view, do not need to be ribbed panels.

1. Material: Zinc-coated (galvanized) steel sheet, 0.0209 inch thick.

a. Exterior Finish: Fluoropolymer.
b. Color: As selected by Architect from manufacturer's full range.

2. Major-Rib Spacing: 12 inches o.c.
3. Panel Coverage: 36 inches.
4. Panel Height: 1.25 inches.

2.11 TRANSLUCENT PANELS

A. Fire-Test-Response Characteristics: Provide panels with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Flame Spread: 25 or less.
2. Smoke Developed: 450 or less.

B. Insulated Translucent Panels: Fabricate insulating units of 2 sheets of glass-fiber-reinforced polyester, translucent plastic separated by an air space; complying with ASTM D 3841, Type CC1 (limited flammability), Grade 1 (weather resistant); smooth finish on both sides. Match profile of adjacent metal panels.

1. Exterior Panel Weight: Not less than 8 oz./sq. ft..
2. Interior Panel Weight: Not less than 8 oz./sq. ft..
3. Light Transmittance: Not less than 42 percent according to ASTM D 1494.
4. Metal Edge: Fabricate full length of each side of panel with metal edge for seaming into standing-seam roof panel joint.
5. Color: White.

C. Mastic for Translucent Panels: Nonstaining, saturated vinyl polymer as recommended by translucent panel manufacturer for sealing laps.

2.12 METAL SOFFIT PANELS

A. General: Provide factory-formed metal soffit panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.

B. Metal Soffit Panels: Match profile and material of metal roof and wall panels.

1. Finish: Match finish and color of metal wall panels.

C. Concealed-Fastener Metal Soffit Panels: Formed with vertical panel edges and a single wide recess, centered between panel edges; with flush joint between panels; with 1-inch- wide flange for attaching interior finish; designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps.

1. Material: Zinc-coated (galvanized) steel sheet, 0.0209 inch thick.

a. Exterior Finish: Fluoropolymer.
b. Color: As selected by Architect from manufacturer's full range.

2. Panel Coverage: 16 inches.
3. Panel Height: 1.5 inches.

2.13 ACCESSORIES

A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels, unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.
2. Clips: Manufacturer's standard, formed from stainless-steel sheet, designed to withstand negative-load requirements.
3. Cleats: Manufacturer's standard, mechanically seamed cleats formed from stainless-steel sheet or nylon-coated aluminum sheet.
4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
5. Closure Strips: Closed-cell, expanded, cellular, rubber or cross linked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or pre-molded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
6. Thermal Spacer Blocks: Where metal panels attach directly to purlins, provide thermal spacer blocks of thickness required to provide 1 inch standoff; fabricated from extruded polystyrene.

C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.

1. Closures: Provide closures at eaves and rakes, fabricated of same material as metal wall panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or cross linked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or pre-molded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

D. Flashing and Trim: Formed from minimum 0.0159-inch- thick, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet pre-painted with coil coating; finished to match adjacent metal panels.

1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
2. Opening Trim: Minimum 0.0269-inch- thick, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet pre-painted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.

E. Gutters: Formed from minimum 0.0159-inch- thick, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet pre-painted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."

1. Gutter Supports: Fabricated from same material and finish as gutters; spaced 36 inches o.c.

F. Downspouts: Formed from 0.0159-inch- thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet pre-painted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot- long sections, complete with formed elbows and offsets.

1. Mounting Straps: Fabricated from same material and finish as gutters; spaced 10 feet o.c.

G. Roof Ventilators: Gravity type, complete with hardware, flashing, closures, and fittings.

1. Continuous or Sectional-Ridge Type: Factory-engineered and -fabricated, continuous unit; fabricated from minimum 0.0159-inch- thick, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet pre-painted with coil coating; finished to match metal roof panels. Fabricated in minimum 10-foot- long sections. Provide throat size and total length indicated, complete with side baffles, ventilator assembly, end caps, splice plates, and reinforcing diaphragms.

a. Bird Screening: Galvanized steel, 1/2-inch- square mesh, 0.041-inch wire, or aluminum, 1/2-inch- square mesh, 0.063-inch wire.
b. Dampers: Manually operated, spring-loaded, vertically rising type; chain and worm gear operator; with chain of length required to reach within 36 inches above floor.
c. Throat Size: 9 or 12 inches, as standard with manufacturer, and as required to comply with ventilation requirements.

H. Louvers: Size and design indicated; self-framing and self-flashing. Fabricate welded frames from minimum 0.0428-inch- thick, metallic-coated steel sheet; finished to match metal wall panels. Form blades from 0.0329-inch- thick, metallic-coated steel sheet; folded or beaded at edges, set at an angle that excludes driving rains, and secured to frames by riveting or welding. Fabricate louvers with equal blade spacing to produce uniform appearance. Louver sub frames and flashings shall be galvanized and painted with a rust inhibitive coating to match the metal wall panel.

1. Blades: Fixed.
2. Free Area: Not less than 7.0 sq. ft. for 48-inch- wide by 48-inch- high louver.
3. Bird Screening: Galvanized steel, 1/2-inch- square mesh, 0.041-inch wire; with rewirable frames, removable and secured with clips, fabricated of same kind and form of metal and with same finish as for louvers.

a. Mounting: Interior face of louvers.

4. Vertical Mullions: Provide mullions at spacings recommended by manufacturer, or 72 inches o.c., whichever is less.

I. Roof Curbs: Fabricated from minimum 0.0428-inch- thick, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet pre-painted with coil coating; finished to match metal roof panels; with welded top box and bottom skirt, and integral full-length cricket; capable of withstanding indicated loads and of size and height indicated.

1. Curb Sub-framing: Minimum 0.0528-inch- thick, angle-, C-, or Z-shaped steel sheet.
2. Insulation: 1-inch- thick, rigid type.

J. Pipe Flashing: Pre-molded, EPDM pipe collar with flexible aluminum ring bonded to base.

2.14 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.15 SOURCE QUALITY CONTROL

A. Special Inspector: Owner will engage a qualified special inspector to perform the following tests and inspections and to submit reports. Special Inspector will verify that manufacturer maintains detailed fabrication and quality-control procedures and will review the completeness and adequacy of those procedures to perform the Work.

1. Special inspections will not be required if fabrication is performed by a manufacturer registered and approved by Authorities Having Jurisdiction to perform such Work without special inspection.

a. After fabrication, submit certificate of compliance with copy to Authorities Having Jurisdiction certifying that Work was performed according to Contract requirements.

B. Tests and Inspections:

1. Bolted Connections: Shop-bolted connections shall be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
2. Welded Connections: In addition to visual inspection, shop-welded connections shall be tested and inspected according to AWS D1.1 and the following inspection procedures, at inspector's option:

a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
c. Ultrasonic Inspection: ASTM E 164.
d. Radiographic Inspection: ASTM E 94.

C. Correct deficiencies in Work that test reports and inspections indicate do not comply with the Contract Documents.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

1. For the record, prepare written report, endorsed by Erector, listing conditions detrimental to performance of work.

B. Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with Erector present, for compliance with requirements and metal building system manufacturer's tolerances.

1. Engage land surveyor to perform surveying.

C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.

B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place, unless otherwise indicated.

3.3 ERECTION OF STRUCTURAL FRAMING

A. Erect metal building system according to manufacturer's written erection instructions and erection drawings.

B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.

C. Set structural framing accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

D. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.

F. Primary Framing and End Walls: Erect framing true to line, level, plumb, rigid, and secure. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist cure grout for not less than seven days after placement.

1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

    a. Joint Type: Snug tightened or pretensioned.

G. Secondary Framing: Erect framing true to line, level, plumb, rigid, and secure. Fasten secondary framing to primary framing using clips with field connections using non-high-strength bolts.

1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
2. Locate and space wall girts to suit openings such as doors.
3. Locate canopy framing as indicated.
4. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.

H. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.

1. Tighten rod and cable bracing to avoid sag.
2. Locate interior end-bay bracing only where indicated.
3. Bracing shall be designed by a licensed professional engineer to accommodate wind loading during erection.

I. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.

J. Erection Tolerances: Maintain erection tolerances of structural framing within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.4 METAL PANEL INSTALLATION, GENERAL

A. Examination: Examine primary and secondary framing to verify that structural panel support members and anchorages have been installed within alignment tolerances required by manufacturer.

1. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before metal panel installation.

B. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.

    a. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.

2. Install metal panels perpendicular to structural supports, unless otherwise indicated.
3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
4. Locate and space fastenings in uniform vertical and horizontal alignment.

5. Locate metal panel splices over, but not attached to, structural supports with end laps in alignment. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
6. Lap metal flashing over metal panels to allow moisture to run over and off the material.

C. Lap-Seam Metal Panels: Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or metal panels. Install screws in predrilled holes.

1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.

D. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

E. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal panel manufacturer.

1. Seal metal panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal panel manufacturer.

3.5 METAL ROOF PANEL INSTALLATION

A. General: Provide metal roof panels of full length from eave to ridge, unless otherwise indicated or restricted by shipping limitations.

1. Install ridge caps as metal roof panel work proceeds.
2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.

B. Field-Assembled, Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
4. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels for fasteners.

5. Provide metal closures at peaks rake edges rake walls and each side of ridge caps.

C. Metal Roof Panel Installation Tolerances: Shim and align metal roof panels within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 METAL WALL PANEL INSTALLATION

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.
2. Shim or otherwise plumb substrates receiving metal wall panels.
3. When two rows of metal panels are required, lap panels 4 inches minimum.
4. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.
5. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Predrill panels.
6. Flash and seal metal wall panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
7. Install screw fasteners in predrilled holes.
8. Install flashing and trim as metal wall panel work proceeds.
9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated, or if not indicated, as necessary for waterproofing.
10. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws.
11. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

B. Field-Assembled, Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.

1. Field-Insulated Assemblies: Install thermal insulation as specified. Install metal liner panels over insulation on interior side of girts at locations indicated. Fasten with exposed fasteners as recommended by manufacturer.

C. Installation Tolerances: Shim and align metal wall panels within installed tolerance of 1/4 inch in 20 feet, non-accumulative, on level, plumb, and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.7 TRANSLUCENT PANEL INSTALLATION

A. Translucent Panels: Attach translucent panels to structural framing with fasteners according to manufacturer's written instructions. Install panels perpendicular to

supports, unless otherwise indicated. Anchor translucent panels securely in place, with provisions for thermal and structural movement.

1. Provide end laps of not less than 6 inches and side laps of not less than 1-1/2-inch corrugations for metal roof panels.
2. Align horizontal laps with adjacent metal panels.
3. Seal intermediate end laps and side laps of translucent panels with translucent mastic.

3.8 METAL SOFFIT PANEL INSTALLATION

A. Provide metal soffit panels full width of soffits. Install panels perpendicular to support framing.

B. Flash and seal metal soffit panels with weather closures where panels meet walls and at perimeter of all openings.

3.9 THERMAL INSULATION INSTALLATION FOR FIELD-ASSEMBLED METAL PANELS

A. General: Install insulation concurrently with metal wall panel installation, in thickness indicated to cover entire wall, according to manufacturer's written instructions.

1. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.
2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
3. Install factory-laminated, vapor-retarder-faced blankets straight and true in one-piece lengths with both sets of facing tabs sealed to provide a complete vapor retarder.
4. Install blankets straight and true in one-piece lengths. Install vapor retarder over insulation with both sets of facing tabs sealed to provide a complete vapor retarder.

B. Blanket Roof Insulation: Comply with the following installation method:

1. Over-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing members. Install layer of filler insulation over first layer to fill space formed by metal roof panel standoffs. Hold in place by panels fastened to standoffs.
2. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
3. Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks.

C. Blanket Wall Insulation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing members. Hold in place by metal wall panels fastened to secondary framing.

1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

D. Replace torn, cut, or ripped insulation panels, use new undamaged panels.

E. Install insulation panels to match the metal building exterior at the hangar door.

3.10 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Install components for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
3. Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

C. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 4 feet o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

D. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.

1. Tie downspouts to underground drainage system indicated.

E. Continuous Roof Ventilators: Set ventilators complete with necessary hardware, anchors, dampers, weather guards, rain caps, and equipment supports. Join sections with splice plates and end-cap skirt assemblies where required to achieve indicated length. Install preformed filler strips at base to seal ventilator to metal roof panels.

F. Louvers: Locate and place louver units level, plumb, and at indicated alignment with adjacent work.

1. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
2. Provide perimeter reveals and openings of uniform width for sealants and joint fillers.
3. Protect galvanized- and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.
4. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Division 7 Section "Caulking and Sealants" for sealants applied during louver installation.

G. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform the following tests and inspections and to submit reports.

B. Special Inspector: Owner will engage a qualified special inspector to perform the following tests and inspections and to submit reports.

C. Tests and Inspections:

1. High-Strength, Field-Bolted Connections: Connections shall be tested and inspected during installation according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
2. Welded Connections: In addition to visual inspection, field-welded connections shall be tested and inspected according to AWS D1.1 and the following inspection procedures, at inspector's option:

a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
c. Ultrasonic Inspection: ASTM E 164.
d. Radiographic Inspection: ASTM E 94.

D. Correct deficiencies in Work that test reports and inspections indicate do not comply with the Contract Documents.

3.12 ADJUSTING

A. Doors: After completing installation, test and adjust doors to operate easily, free of warp, twist, or distortion.

B. Door Hardware: Adjust and check each operating item of door hardware and each door to ensure proper operation and function of every unit. Replace units that cannot be adjusted to operate as intended.

1. Door Closers: Adjust door closers to compensate for final operation of heating and ventilating equipment. Adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

2. Refer to Section “Metal Doors and Frames” for additional requirements.

3.13 CLEANING AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

C. Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates, and accessories.

1. Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or SSPC-SP 3, "Power Tool Cleaning."
2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

D. Touchup Painting: Cleaning and touchup painting are specified in Division 9 painting Sections.

E. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

1. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

F. Doors and Frames: Immediately after installation, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

1. Immediately before final inspection, remove protective wrappings from doors and frames.

G. Louvers: Clean exposed surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.

1. Restore louvers damaged during installation and construction period so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

a. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 13341

SECTION 210000 – FIRE PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Basic Requirements: Provisions of Section 23 05 01, BASIC MECHANICAL REQUIREMENTS, are a part of this Section.

1.2 SUMMARY

A. General: Provide the fire protection systems indicated on the drawings and within this specification section.

1.3 SUBMITTALS

A. General: Include the following data:

B. Manufacturers Literature:

1. Dimensional outline drawing and verification of UL/FM approval for the following list of equipment:

a. Each different type of valve.
b. Each different type of piping hanger, supports, and sleeves.
c. Each type of fire sprinklers.
d. Fire department connection.
e. Waterflow devices and supervisory switches.
f. Piping and fittings.
g. Firestopping.
h. Inspectors test and drain.

C. Installation Instructions:

1. Manufacturer's printed instructions for the installation of sprinkler system items including copies shipped with the equipment.

D. Maintenance Instructions:

1. Test procedures and frequency of testing required for each component per manufacturer’s recommendations.

2. Instructions to the Owner's designated employees on the operation of the entire system.

E. Piping Shop Drawings: Submit 1/4" scale piping shop drawings as prescribed in Section 15010 and as required by codes. Shop drawings shall include sprinkler piping cut lengths, offsets, fittings and devices, elevations, hangar locations, sprinkler head count by type, elevation sections and other installation information.

F. Submit hydraulic calculations proving the viability of the most hydraulically remote areas of the project. Indicate hydraulic reference points and submit computer analyzed nodal calculations in both tabular and graphical formats. Hydraulic imbalance shall not exceed 0.01 gpm at any node, and water velocity shall not exceed 20 feet per second. Demonstrate compliance with the requirements of NFPA-13 regarding density, area of application, selection of hydraulically remote areas, and maximum coverage per sprinkler.

G. Test Plan: Submit a "Test Plan" which describes how the system(s) will be tested, including a step-by-step procedure of all tests indicating type and location of test apparatus to be employed. The tests shall demonstrate that the operating and installation requirements have been met.

1.4 APPLICABLE STANDARDS

A. General: All equipment, material, accessories, methods of construction and reinforcement, finish quality, workmanship and installation shall be in compliance with the paragraph entitled "Code Compliance" in Section 23 05 01.

B. NFPA - Fire Sprinkler System: The fire sprinkler protection systems installation, flushing and testing shall comply with the requirements of NFPA 13, 24, and 25.

C. Pipe Thread Pattern: All threads shall be in accordance with local fire department specifications and NFPA.

D. UL/FM Approval: All equipment, valves, couplings, hangers and devices shall be approved by Underwriters' Laboratory (UL) and Factory Mutual (FM) for use in fire protection service.

E. Florida Building Code: 2017.

1.5 QUALITY ASSURANCE

A. Licensure: The fire protection systems shall be installed by a State Certified Fire Protection Contractor.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. General: Refer to Section 23 05 01.

B. Single Manufacturer: All items of a similar type shall be by the same manufacturer.

2.2 QUICK-RESPONSE SPRINKLER HEADS

A. General: Provide upright, horizontal sidewall, or pendant-type sprinkler heads with quick-response action, with integral chrome-plated escutcheon plate.

B. Pendent: Pendant sprinklers shall be manufactured for installation below the branch line.

0. Acceptable Manufacturers:

a. Viking
b. Tyco
c. Reliable

C. Upright: Upright sprinkler heads shall be manufactured with upright deflectors for installation above the branch line.

0. Acceptable Manufacturers:

a. Viking
b. Tyco
c. Reliable

D. Concealed: Concealed sprinklers shall be manufactured for installation below the branch line. Sprinkler shall be covered with a large diameter white cover plate which shall have an intermediate temperature rating unless otherwise indicated. The cover link shall be fusible and shall fall away from the frame, exposing the sprinkler head when the temperature rating has been achieved.

0. Acceptable Manufacturers:

a. Viking
b. Tyco
c. Reliable Model G-1

E. Recessed: Recessed sprinklers shall be manufactured for installation below the branch line. Sprinkler shall be white and furnished with a recessed escutcheon.

0. Acceptable Manufacturers:

a. Viking
b. Tyco
c. Reliable

F. Horizontal Sidewall: Sidewall sprinklers shall be manufactured with horizontal deflectors for installation adjacent to the juncture of the ceiling and wall.

0. Acceptable Manufacturers:

a. Viking
b. Tyco

c. Reliable

G. Spare Fire Sprinkler Cabinet: Provide sufficient spare sprinklers cabinets to store the required quantities of sprinklers in accordance with NFPA 13. Storage cabinets shall be red gloss, polyester-coated steel construction. Provide a minimum of six spare sprinklers of each type and each different temperature rating installed; provide (2) two installation tools or wrenches with each different type of sprinkler head. Cabinet shall have catch-lock and continuous piano hinge. Locate the spare fire sprinkler cabinet as directed by Fire Department.

1. Acceptable Manufacturers:

a. Viking
b. Tyco
c. Reliable

H. Sprinkler Cage Guard: Provide open-wire cage guard to protect sprinklers from damage. Cage wire shall be cadmium-plated steel.

1. Acceptable Manufacturers:

a. Viking
b. Tyco
c. Reliable

2.3 PIPE AND FITTINGS

A. General: Only the following materials designed for 175 psig CWP shall be used for fire protection piping unless specifically indicated otherwise. All piping materials shall have a corrosion resistance rating (CCR) of 1.0 or greater.

B. Pipe: 2 inch and smaller pipe, and all threaded or welded piping shall be black steel, Schedule 40, ASTM A-53. 2-1/2 inch and larger pipe shall be black steel with roll-grooved or welded joints, Schedule 10, ASTM A-135.

C. Fittings: 2 inch and smaller pipe shall be joined by mechanical couplings, threaded or welded fittings; 2-1/2” and larger pipe shall be joined by rolled groove couplings or welded fittings only. Welded branch connections which are at least 2 nominal pipe sizes smaller than the main are permitted. Threaded fittings are acceptable only for piping 2 inches and smaller.

D. Corrosion Protection: All black steel pipe and fittings exposed to the exterior, moisture or corrosive fumes shall have a protective coating, such as factory hot-dipped galvanization; galvanized painting of piping is prohibited.

E. Flanges: Flanged fittings shall be threaded or welded, cast iron or steel, short body, Class 125. Gaskets shall be full face 1/8-inch minimum thickness red sheet rubber. Flange bolts shall be hexagon head machine bolts with heavy semi-finished hexagon head nuts, cadmium plated, having dimensions in accordance with ANSI B18.2. Grooved flanges

shall not be permitted. Flange gaskets for dry pipe systems shall be made of material specifically listed for air service.

F. Underground Piping: Underground piping shall be Ductile Iron Class 52, UL/FM approved. Fittings shall be Class 250, Mechanical Joint. All underground pipe lengths and bends shall be rodded and all bends shall have thrust blocks.

2.4 VALVES

A. Gate Type Isolation, 2-1/2 Inch and Larger: Isolation valves 2-1/2 inch and larger shall be gate valves with open screw and yoke. Valve shall have cast iron body with the valve size, pressure rating, manufacturer, and "UL" and "FM" cast into the body. Valve shall have bronze or cast iron double disc and wedge, cast iron handwheel, bolted cast iron bonnet, non-re-lubricatable bronze stem with O-ring seals, and corrosion inhibiting asphalt varnish finish. Valve shall have 175 psig CWP working pressure, 350 psig test pressure, flanged connections, and shall be provided with an integral tamper switch.

1. Acceptable Manufacturers:

a. Stockham
b. Mueller
c. Crane
d. Nibco

B. Butterfly Type Isolation, 2-1/2 Inch and Larger: Isolation valves 2-1/2 inch and larger shall be cast iron body butterfly valves with the valve size, pressure rating, manufacturer and "UL" and "FM" cast into the body. Valve shall have bronze or cast iron disc, neoprene disc liner, cast iron handwheel with disc position indicator, integral tamper switch, 175 psig CWP working pressure, 350 psig CWP test pressure, and flanged or grooved connections.

1. Acceptable Manufacturers:

a. Victaulic Series 708
b. Grinnell 8000 FP
c. Central ModelBFV

C. Check Valve: Check valves shall be horizontal swing type rated for 175 psig CWP working pressure and 350 psig test pressure. Check valves shall have cast iron body with the valve size, "UL", "FM" and flow directional arrow cast into the body; bronze disc ring with cast iron disc; bronze hinge and hinge plug; malleable iron clapper arm; and bolted cast iron cover. Provide factory painted or hot-dipped galvanized finish.

1. Acceptable Manufacturers:

a. Flanged Connection:

1) Stockham
2) Mueller
3) Viking

b. Grooved Connection:

1) Reliable
2) Grinnell
3) Viking

D. Detector Check Valve: Water leak/metering detector check valves shall comply with the requirements of check valves herein, except that the seat ring shall be rubber and the valve body shall have tappings to allow installation of a water meter. Provide a factory-assembled water meter and trim assembly consisting of a pre-formed copper tubing bypass, brass fittings, angle stop and integral dual check valves.

E. Indicator Valve: Indicator valves shall be gate valve with non-rising bronze stem. Valve shall have cast iron body with the valve size, pressure rating, manufacturer, and "UL" and "FM" cast into the body. Valve shall have cast iron double disc and wedge, bronze seat ring, square cast iron operating nut compatible with the indicator socket, bolted cast iron bonnet, cast iron post indicator valve stuffing box with fiber gasket and rubber O-rings, cast iron indicator post flange, and asphalt varnish finish. Valve shall have 175 psig CWP working pressure, 350 psig test pressure, and flanged connections.

1. Acceptable Manufacturers:

a. Mueller
b. Viking
c. Stockham

2.5 WATERFLOW DEVICES AND SUPERVISORY SWITCHES

A. Isolation Valve Tamper Switch: Provide an electronic supervisory or tamper switch on each isolation valve in the sprinkler system. Unit shall have a red tamper-proof cover which will activate an alarm or trouble signal when adjusted. Provide unit with single-pole, normally closed microswitch, mounting bracket, and non-resettable lock with removable reset key.

1. Acceptable Manufacturers:

a. Simplex
b. Potter-Roemer
c. Potter Electric Signal Co

B. Flow Switch: Provide an electric flow switch where indicated or required. Flow shall be sensed by an immersion paddle, with an adjustable retard setting from 0 to 70 seconds to minimize false alarms. Flow switch shall have 2 separate single pole, double throw microswitches to activate a flow alarm, or to indicate a trouble signal if the flow switch housing is tampered. Flow alarm shall be automatically resetting. Provide clamp-on housing to secure unit to pipe, or threaded connection for tee fitting.

1. Acceptable Manufacturers:

a. Potter-Roemer
b. Potter Electric Signal Co
c. System Sensor

C. Inspector's Test and Drain: Test and drain shall be provided with integral sight glass, integral 1/2-inch test orifice and positive positioning of handle for off, test and drain operations.

1. Acceptable Manufacturers:

a. G/J Innovations, Inc
b. AGF Manufacturing, Inc
c. Victaulic

D. Electric Alarm Bell: 10-inch electric bell 120 VAC.

1. Acceptable Manufacturers:

a. Notifier
b. Potter-Roemer
c. Potter Electric Signal Co

PART 3 - EXECUTION

3.1 INSTALLATION

A. Water Service Connection: Provide a double check valve backflow preventer in the fire service connection to the domestic water main. Refer to civil plans.

B. Hangers: Pipe hangers on 4 inch and larger piping shall be clevis-type only. All hanger spacing shall comply with the requirements of NFPA-13.

C. Sprinkler Location: Install sprinklers in the center of the ceiling tiles for suspended ceiling applications.

D. Flushing: The entire system shall be flushed with clean water to remove debris resulting from installation. Flush through a burlap bag to retain debris for examination.

E. Prohibited: Do not paint any fire sprinklers.

3.2 EQUIPMENT INSTRUCTION PLATES

A. General: Provide engraved instruction plates detailing emergency procedures at each system control panel and at each hazard area manual discharge station locations. Permanent nameplates shall be used in the control panel to identify control logic units, contactors and major circuits.

3.3 HYDROSTATIC TESTS

A. General: Above ground and below ground piping systems shall be hydrostatically tested at not less than 200 psi pressure, or at 50 psi in excess of the maximum pressure, whichever is greater, for a period of 2 hours. The test pressure shall be read from a gauge located at the low elevation point of the individual system or portion of the system being tested. The sprinkler piping shall not have leakage exceeding the amounts specified in NFPA 24. Leakage quantities shall be determined by pumping at the specified test pressure from a calibrated container. Repair leaking joints and retest as necessary until all systems have been tested. Test the piping between the check valve in the fire department inlet pipe and the outside connection the same as the balance of the system.

B. Test Blank: Test blanks (blind flanges) used shall be the self-indicating type, with red painted lugs protruding beyond the flange to clearly indicate their presence. Number all test blanks to assure removal after the testing is completed.

3.4 SYSTEM INSPECTION AND CHECKOUT

A. General: After the installation is complete, the system shall be inspected by factory trained personnel in accordance with the manufacturer's recommended procedures.

B. System Operation: Operate systems as required to demonstrate that the systems are operating in accordance with the design, including line pressure testing. Supply instruments required to read data. Adjust systems to operate at the required performance levels. Advise Designer 7 days prior to testing. Tabulate data and submit on 8-1/2 x 11 inch sheets with time, name of tester and the local Authority Having Jurisdiction witnessing the test, with one copy for each Technical Information Brochure.

3.5 INSTRUCTIONS TO OWNER

A. General: Provide to Owner's designated representatives a minimum of 2 hours classroom and on-site instructions in operation and maintenance of all fire protection systems and equipment. Furnish 6 sets of typed operating instructions. Written and signed acknowledgement of the instructions seminar shall be submitted prior to final acceptance. Submit in writing to the Owner an "Instruction in Operation Conference" notification of the mutually agreed upon time for the conference. At the end of the conference, 6 copies of an Instruction in Operation Conference Memo shall be signed by all parties and one copy shall be inserted in each Technical Information Brochure.

END OF SECTION 210000

SECTION 220000 – COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Transition fittings.
3. Dielectric fittings.
4. Mechanical sleeve seals.
5. Sleeves.
6. Escutcheons.
7. Grout.
8. Equipment installation requirements common to equipment sections.
9. Painting and finishing.
10. Concrete bases.
11. Supports and anchorages.

1.2 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. CPVC: Chlorinated polyvinyl chloride plastic.
2. PVC: Polyvinyl chloride plastic.

G. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.

2. NBR: Acrylonitrile-butadiene rubber.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Transition fittings.
2. Dielectric fittings.
3. Mechanical sleeve seals.
4. Escutcheons.

B. Welding certificates.

1.4 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for Mechanical Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.6 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for mechanical installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for mechanical items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Solvent Cements for Joining Plastic Piping:

1. CPVC Piping: ASTM F 493.
2. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
3. PVC to ABS Piping Transition: ASTM D 3138.

2.4 TRANSITION FITTINGS

A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

1. Manufacturers:

a. Cascade Waterworks Mfg. Co.
b. Dresser Industries, Inc.; DMD Div.
c. Ford Meter Box Company, Incorporated (The); Pipe Products Div.
d. JCM Industries.
e. Smith-Blair, Inc.
f. Viking Johnson.

2. Underground Piping NPS 1-1/2 and Smaller: Manufactured fitting or coupling.
3. Underground Piping NPS 2 and Larger: AWWA C219, metal sleeve-type coupling.
4. Aboveground Pressure Piping: Pipe fitting.

B. Plastic-to-Metal Transition Fittings: CPVC and PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

1. Manufacturers: Eslon Thermoplastics.

C. Plastic-to-Metal Transition Adaptors: One-piece fitting with manufacturer's SDR 11 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

1. Manufacturers: Thompson Plastics, Inc.

D. Plastic-to-Metal Transition Unions: MSS SP-107, CPVC and PVC four-part union. Include brass end, solvent-cement-joint end, rubber O-ring, and union nut.

1. Manufacturers:

a. NIBCO INC.

b. NIBCO, Inc.; Chemtrol Div.

E. Flexible Transition Couplings for Underground Nonpressure Drainage Piping: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

1. Manufacturers:

a. Cascade Waterworks Mfg. Co.
b. Fernco, Inc.
c. Mission Rubber Company.
d. Plastic Oddities, Inc.

2.5 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

1. Manufacturers:

a. Capitol Manufacturing Co.
b. Central Plastics Company.
c. Eclipse, Inc.
d. Epco Sales, Inc.
e. Hart Industries, International, Inc.
f. Watts Industries, Inc.; Water Products Div.
g. Zurn Industries, Inc.; Wilkins Div.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

1. Manufacturers:

a. Capitol Manufacturing Co.
b. Central Plastics Company.
c. Epco Sales, Inc.
d. Watts Industries, Inc.; Water Products Div.

E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Manufacturers:

a. Advance Products & Systems, Inc.

b. Calpico, Inc.
c. Central Plastics Company.
d. Pipeline Seal and Insulator, Inc.

2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.

F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

1. Manufacturers:

a. Calpico, Inc.
b. Lochinvar Corp.

G. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

1. Manufacturers:

a. Perfection Corp.
b. Precision Plumbing Products, Inc.
c. Sioux Chief Manufacturing Co., Inc.
d. Victaulic Co. of America.

2.6 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Manufacturers:

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Metraflex Co.
d. Pipeline Seal and Insulator, Inc.

2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Stainless steel Include two for each sealing element.
4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.7 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.

F. PVC Pipe: ASTM D 1785, Schedule 40.

G. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

2.8 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With set screw.

1. Finish: Polished chrome-plated and rough brass.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

1. Finish: Polished chrome-plated and rough brass

E. One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.

F. Split-Plate, Stamped-Steel Type: With concealed exposed-rivet hinge, set screw or spring clips, and chrome-plated finish.

G. One-Piece, Floor-Plate Type: Cast-iron floor plate.

H. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.9 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.

b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
c. Insulated Piping: One-piece, stamped-steel type with spring clips.
d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece or split-casting, cast-brass type with polished chrome-plated finish.
f. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type with concealed or exposed-rivet hinge and set screw or spring clips.
g. Bare Piping in Equipment Rooms: One-piece, stamped-steel type with set screw or spring clips.
h. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.

M. Sleeves are not required for core-drilled holes.

N. Permanent sleeves are not required for holes formed by removable PE sleeves.

O. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 7 Section "Sheet Metal Flashing and Trim" for flashing.

1) Seal space outside of sleeve fittings with grout.

4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.

Q. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

R. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

S. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations under Division 7 Section Firestopping.

T. Verify final equipment locations for roughing-in.

U. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
3. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
4. PVC Nonpressure Piping: Join according to ASTM D 2855.
5. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End Pipe and Fittings: Use butt fusion.
2. Plain-End Pipe and Socket Fittings: Use socket fusion.

3.3 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.

4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.5 PAINTING

A. Painting of mechanical systems, equipment, and components is specified in Division 9 Sections

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.6 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section 033000 - Cast-in-Place.

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 5 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.8 GROUTING

A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 220000

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SECTION 220500 – PLUMBING PIPING SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Basic Requirements: Provisions of Section 23 05 01, BASIC MECHANICAL REQUIREMENTS, are a part of this Section.

1.2 SUMMARY

A. General: Provide domestic water piping, drainage waste and vent piping, and other plumbing piping and appurtenances as indicated.

1.3 SUBMITTALS

A. General: Provide shop drawing and manufacturer's data sheet for the following items:

1. Manufacturers Literature:

   a. Product data for recirculating hot water system.
   b. Product data for valve boxes and accessories.
   c. Complete list of all piping materials to be used in this section including valves, pipe schedules, pipe sizes and method of connection for each piping system.

2. Installation Instructions:

   a. Manufacturer's printed installation instructions for the non-recirculating hot water system.
   b. Assembly and installation instructions for valve boxes and extensions.

1.4 APPLICABLE STANDARDS

A. General: All equipment, material, accessories, methods of construction and reinforcement, finish quality, workmanship and installation shall be in compliance with the paragraph entitled "Code Compliance" in Section 23 05 01.

PART 2 - PRODUCTS

2.1 GENERAL

A. Application: The plumbing piping system shall only be of the materials indicated. Insulation shall comply with ASTM E-84 requirements with a flame spread rating not exceeding 25 and with a smoke developed/fuel contributed rating not exceeding 50.

B. Valves: All valves used in the plumbing piping shall be 125 psi SWP, 200 psi WOG. Compressed air valves shall be rated for at least 150% of the maximum working pressure of the piping system.

C. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International.

D. Install underground copper tube in PE encasement according to ASTM A 674 or AWWA C105.

2.2 DOMESTIC WATER PIPE

A. Above Ground:

1. Piping shall be copper tube, Type L, hard drawn.

B. Underground:

1. Type K soft drawn copper tubing without joints shall be used up to 4 inch diameter.

C. Fitting:

1. Copper Piping

a. Piping shall be wrought-copper, silver-soldered joint fittings and brazed joints.

2.3 SANITARY WASTE AND VENT PIPING

A. Above Ground:

1. Cast iron soil pipe, service weight, with bell and spigot joints.
2. Cast iron soil pipe, service weight, with no-hub couplings. For above ground installation only.

a. Shielded Couplings: ASTM C 1540 assembly of metal shield of housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop.

1) Heavy-duty, shielded, stainless-steel couplings: with stainless-steel bands and tightening devices, and ASTM C 564 rubber sleeve.

3. Copper: Type DWV with soldered joints.
4. Brass pipe or tube, chrome plated, where exposed in finished areas.

B. Below Ground:

1. Cast iron soil pipe, service weight, with bell and spigot joints.
2. PVC: PVC piping shall be permitted below grade only.

a. Type DWV, Schedule 40, ASTM D-1784 and D-2665.

3. Trench Drain Waste Piping

    a. Ductile iron centrifugally cast in accordance with AWWA C151. Push-on joints shall conform to AWWA C111. Gasket material shall be FKM with high chemical resistance to petroleum products (Jet A Fuel). Piping shall be provided with cement-mortar lining in accordance with ANSI/AWWA C104/A21.4.

2.4 CONDENSATE DRAIN PIPING

A. General: Unless otherwise specifically noted condensate drain piping shall be the same as sanitary waste and vent piping.

2.5 COMPRESSED AIR PIPING

A. Copper tubing, hard drawn, meeting ASTM B88. Fittings shall be wrought copper in accordance with ASTM B16.22.

B. Joints shall be silver solder in accordance with ASTM B32.

C. Provide drip legs at low points in system and at compressed air outlets.

D. Install take-offs from top of main with shut-off valve and regulator at each compressed air station.

E. As an alternative to copper tubing, aluminum compressed air piping with solid brass nickel plated fittings may be provided for above grade installation only. The system shall meet ANSI B31.1 and have a pressure rating of 5 times the maximum working pressure.

2.6 THERMAL INSULATION

A. General: All insulation, jackets and adhesives used shall comply with the requirements of ASTM E-84 with a maximum flame spread rating of 25 and a maximum smoke developed/fuel contributed rating of 50. Insulation on piping exposed in boiler rooms, mechanical equipment rooms, air handling equipment rooms, etc. or exposed on the exterior of the building shall be cellular glass. Insulation for concealed piping shall be preformed pipe insulation as follows:

1. Exterior Domestic Cold Water and Hot Water (includes hangar areas):

    a. Cellular Glass

2. Domestic Hot Water:

    a. Fiberglass

3. Condensate Drain:

a. Elastomeric

4. Lavatory and Sink Drains:

a. Flexible closed cell insulation with 0.28k factor at 75°F mean temperature difference.

B. Thickness: The insulation thickness in inches shall be in accordance with the following table:

TABLE - PIPING INSULATION THICKNESS

Pipe Size, Inches	Up to 1	1-1/4 to 2	2-1/2 to 4	5 to 6	8 & Up
Cold Water	3/4	3/4	1	1	1
Hot Water	1	1	1-1/2	1-1/2	1-1/2
Condensate Drain	1/2	1/2	1/2	1/2	1/2
Lavatory Drain	—	1/2	—	—	—

* (Or manufacturer's minimum thickness based on the pipe size.)

C. Exposed: For piping, other than domestic cold water, exposed to the outdoor air or in an unconditioned crawl space or cellar area, increase insulation thickness by 1/2 inch.

D. Underground: Piping underground which is indicated to be insulated shall have cellular glass insulation.

E. Jackets:

1. Provide factory or field applied insulation jacket with compatible insulating cements, adhesives, mastics, and sealants, in accordance with the manufacturer’s installation instructions for applicable indoor or exterior conditions. Jacket shall have vapor retarder film.
2. Exterior or indoor insulated piping subject to damage shall be provided with minimum 0.016” aluminum jacket with 3 mil vapor barrier. Secure jacket with stainless steel bands at 12” o.c. and at end joints.
3. Products: Subject to compliance with the requirements, provide insultation jackets and accessories manufactured by:

a. Foster Products Corporation
b. Childers Products
c. RPR Products

2.7 VALVES

A. 2 inch and smaller: Valves 2 inch and smaller shall be ball valves with bronze body and bronze trim, pressure-seal joint fittings.

B. 2-1/2 inch and larger, above ground: Valves 2-1/2 inch and larger shall be butterfly valves with flanged or welded joint connections, cast iron body with bronze trim.

C. Underground: Valves underground shall be butterfly (or ball - 2" and under)-type with cast iron body and bronze trim, flanged or welded connections, and non-rising stem with square wrench nut head.

D. Valve Box: Valve boxes for underground valves shall be cast iron construction with sufficient extension sections to extend flush to finished grade. Provide a cast iron lid and collar, with the word "water" cast into the lid. Provide a steel "T" handle valve operating wrench of sufficient length to operate the installed underground valve and provide a minimum 12 inches above finished grade; valve operating wrench shall be provided with a cast iron or steel socket compatible with the valve stem head.

PART 3 - EXECUTION

3.1 GENERAL

A. Location of Vents: Vents shall be offset as required to penetrate roofs at least 3 feet from the edges of the building, and 10 feet from any supply air intake or operable window or door.

B. Slope: Unless otherwise indicated, horizontal sanitary and storm piping 2-1/2 inches and smaller shall be sloped at a minimum of 1/4 inch per linear foot; piping 3 inches and larger shall be sloped a minimum of 1/8 inch per foot.

C. Vent Piping: Horizontal vent branches shall be kept above the highest fixture served by the vent branch in order to prevent the vent from being used as a waste line. Horizontal vent branches shall be sloped upward to prevent accumulating water or trapping.

D. Vent Connections: Vent piping connected to a horizontal pipe shall be taken from the centerline of the pipe. Vent piping shall rise at an angle not exceeding 45 degrees from vertical, to a point at least 6 inches above the flood rim of the highest attached fixture.

E. Vent Flashing: All vents extending through the roof and not otherwise indicated to have roof penetration seals or pitch pockets shall be flashed. Provide lead flashing with a minimum five pound per square foot density. Crimp the edge and flatten the flashing to maintain the maximum clear area of the pipe. Extend vents and piping through roof a minimum 8 inches above the finished roof surface unless otherwise indicated.

3.2 TESTING

A. Sanitary Piping:

1. Water Test: A water test shall be applied to the sanitary and storm drainage systems. If applied to the entire system, all openings in the piping shall be tightly closed, except the highest opening, and the system filled with water to point of overflow. If the system is tested in sections, each opening shall be tightly plugged

except the highest opening of the section under test, and each section shall be filled with water. In testing successive sections at least the upper 10 feet of the next preceding section shall be tested, so that no joint or pipe (except the uppermost 10 feet of the system) shall be submitted to a test of less than a 10 foot head of water. The water test shall last for at least 30 minutes. The system shall not experience a drop in water level; if a loss of water is noticed, the system shall be repaired and the test resumed until all sections of the piping are watertight.

2. Pneumatic Air Test: An air test may be made by attaching an air compressor or testing apparatus to any opening and, after closing all other inlets and outlets to the system, forcing air into the system until there is a uniform gauge pressure of 5 psi. This pressure shall be held without introduction of additional air for a period of at least 30 minutes. If the test pressure drops, indicating a leak, the piping shall be repaired and the test resumed until all sections of the piping are air tight.

B. Condensate Drain Piping: Sanitary piping test shall be used for condensate drain piping.

C. Domestic Water Piping: Pressure testing and sterilization shall be performed as described in Section 23 21 13.

3.3 STERILIZATION

A. Domestic Water Piping:

1. Clean all water piping. Include storage vessels, and all components and devices in the piping system. Flush thoroughly, sterilize with chlorine solution for minimum 24 hours, then flush clean. Strength of chlorine solution and methods must comply with City Code and Health Authorities. At completion, there must be no discernible odor. Post warnings until sterilization is complete.

3.4 COMPRESSED AIR PIPING:

A. Install compressed air stations as shown on the plans.

B. Compressed air piping shall be tested at a minimum pressure of 1.5 times the system working pressure for 4 hours. Any pipe sections found to have leakage shall be repaired and the test shall be repeated.

END OF SECTION 220500

SECTION 220519 – METERS AND GAGES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following meters and gages for mechanical systems:

1. Thermometers.
2. Gages.

1.2 DEFINITIONS

A. CR: Chlorosulfonated polyethylene synthetic rubber.

B. EPDM: Ethylene-propylene-diene terpolymer rubber.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated; include performance curves.

B. Shop Drawings: Schedule for thermometers, gages, flowmeters indicating manufacturer's number, scale range, and location for each.

C. Product Certificates: For each type of thermometer, gage, and flowmeter signed by product manufacturer.

D. Operation and Maintenance Data: For flowmeters to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 LIQUID-IN-GLASS THERMOMETERS

A. Metal-Case, Industrial-Style, Liquid-in-Glass Thermometers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Flo Fab Inc.
b. Miljoco Corporation.
c. Palmer Wahl Instrumentation Group.

2. Standard: ASME B40.200.
3. Case: Cast aluminum; 7-inch nominal size unless otherwise indicated.
4. Case Form: Adjustable angle unless otherwise indicated.
5. Tube: Glass with magnifying lens and blue organic liquid.
6. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
7. Window: Glass.
8. Stem: Aluminum and of length to suit installation.

   a. Design for Thermowell Installation: Bare stem.

9. Connector: 1-1/4 inches, with ASME B1.1 screw threads.
10. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.3 THERMOWELLS

A. Manufacturers:

1. AMETEK, Inc.; U.S. Gauge Div.
2. Ashcroft Commercial Instrument Operations; Dresser Industries; Instrument Div.
3. Ernst Gage Co.
4. Marsh Bellofram.
5. Miljoco Corp.
6. NANMAC Corporation.

B. Manufacturers: Same as manufacturer of thermometer being used.

C. Description: Pressure-tight, socket-type metal fitting made for insertion into piping and of type, diameter, and length required to hold thermometer.

2.4 PRESSURE GAGES

A. Manufacturers:

1. AMETEK, Inc.; U.S. Gauge Div.
2. Ashcroft Commercial Instrument Operations; Dresser Industries; Instrument Div.
3. Ernst Gage Co.
4. Eugene Ernst Products Co.
5. KOBOLD Instruments, Inc.
6. Marsh Bellofram.

B. Direct-Mounting, Dial-Type Pressure Gages: Indicating-dial type complying with ASME B40.100.

1. Case: Liquid-filled type, drawn steel or cast aluminum, 4-1/2-inch (114-mm) diameter.
2. Pressure-Element Assembly: Bourdon tube, unless otherwise indicated.
3. Pressure Connection: Brass, NPS 1/4 (DN 8), bottom-outlet type unless back-outlet type is indicated.
4. Movement: Mechanical, with link to pressure element and connection to pointer.
5. Dial: Satin-faced, nonreflective aluminum with permanently etched scale markings.
6. Pointer: Red or other dark-color metal.
7. Window: Glass or plastic
8. Ring: Brass.
9. Accuracy: Grade A, plus or minus 1 percent of middle half scale.
10. Vacuum-Pressure Range: 30-in. Hg of vacuum to 15 psig of pressure (100 kPa of vacuum to 103 kPa of pressure).
11. Range for Fluids under Pressure: Two times operating pressure.

C. Pressure-Gage Fittings:

1. Valves: NPS 1/4 (DN 8) brass or stainless-steel needle type.
2. Syphons: NPS 1/4 (DN 8) coil of brass tubing with threaded ends.
3. Snubbers: ASME B40.5, NPS 1/4 (DN 8) brass bushing with corrosion-resistant, porous-metal disc of material suitable for system fluid and working pressure.

PART 3 - EXECUTION

3.1 THERMOMETER APPLICATIONS

A. Install liquid-in-glass thermometers in the following locations:

1. Outlet of each water heater.

B. Install liquid-filled-case-type, vapor-actuated dial thermometers at suction and discharge of each pump.

C. Provide the following temperature ranges for thermometers:

3.2 GAGE APPLICATIONS

A. Install dry-case-type pressure gages for discharge of each pressure-reducing valve..

B. Install liquid-filled-case-type pressure gages at suction and discharge of each pump.

3.3 INSTALLATIONS

A. Install direct-mounting thermometers and adjust vertical and tilted positions.

B. Install remote-mounting dial thermometers on panel, with tubing connecting panel and thermometer bulb supported to prevent kinks. Use minimum tubing length.

C. Install thermowells with socket extending to center of pipe and in vertical position in piping tees where thermometers are indicated.

D. Install direct-mounting pressure gages in piping tees with pressure gage located on pipe at most readable position.

E. Install test plugs in tees in piping.

F. Install flow indicators, in accessible positions for easy viewing, in piping systems.

G. Assemble and install connections, tubing, and accessories between flow-measuring elements and flowmeters as prescribed by manufacturer's written instructions.

H. Install flowmeter elements in accessible positions in piping systems.

I. Install differential-pressure-type flowmeter elements with at least minimum straight lengths of pipe upstream and downstream from element as prescribed by manufacturer's written instructions.

J. Install wafer-orifice flowmeter elements between pipe flanges.

K. Install permanent indicators on walls or brackets in accessible and readable positions.

L. Install connection fittings for attachment to portable indicators in accessible locations.

3.4 ADJUSTING

A. Calibrate meters according to manufacturer's written instructions, after installation.

B. Adjust faces of meters and gages to proper angle for best visibility.

END OF SECTION 220519

SECTION 220529 – HANGERS AND SUPPORTS FOR PLUMBING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following hangers and supports for mechanical system piping and equipment:

1. Steel pipe hangers and supports.
2. Trapeze pipe hangers.
3. Fiberglass pipe hangers.
4. Metal framing systems.
5. Fiberglass strut systems.
6. Thermal-hanger shield inserts.
7. Fastener systems.
8. Pipe stands.
9. Pipe positioning systems.
10. Equipment supports.

B. Related Sections include the following:

1. Section 220529 – Metal Fabrications: For structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.

1.2 DEFINITIONS

A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry Inc.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.3 PERFORMANCE REQUIREMENTS

A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Steel pipe hangers and supports.
2. Thermal-hanger shield inserts.

3. Powder-actuated fastener systems.
4. Pipe positioning systems.

B. Shop Drawings Show fabrication and installation details and include calculations for the following:

1. Trapeze pipe hangers. Include Product Data for components.
2. Metal framing systems. Include Product Data for components.
3. Fiberglass strut systems. Include Product Data for components.
4. Pipe stands. Include Product Data for components.
5. Equipment supports.

C. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

B. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.2, "Structural Welding Code--Aluminum."
3. AWS D1.3, "Structural Welding Code--Sheet Steel."
4. AWS D1.4, "Structural Welding Code--Reinforcing Steel."
5. ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 STEEL PIPE HANGERS AND SUPPORTS

A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.

B. Manufacturers:

1. AAA Technology & Specialties Co., Inc.
2. Bergen-Power Pipe Supports.
3. B-Line Systems, Inc.; a division of Cooper Industries.

4. Carpenter & Paterson, Inc.
5. Empire Industries, Inc.
6. ERICO/Michigan Hanger Co.

C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.4 METAL FRAMING SYSTEMS

A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.

B. Manufacturers:

1. B-Line Systems, Inc.; a division of Cooper Industries.
2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
3. GS Metals Corp.
4. Power-Strut Div.; Tyco International, Ltd.
5. Thomas & Betts Corporation.
6. Tolco Inc.

C. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.5 THERMAL-HANGER SHIELD INSERTS

A. Description: 100-psig- minimum, compressive-strength insulation insert encased in sheet metal shield.

B. Manufacturers:

1. Carpenter & Paterson, Inc.
2. ERICO/Michigan Hanger Co.
3. PHS Industries, Inc.
4. Pipe Shields, Inc.
5. Rilco Manufacturing Company, Inc.
6. Value Engineered Products, Inc.

C. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with vapor barrier.

D. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass.

E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.6 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Not Allowed.

B. Mechanical-Expansion Anchors: Insert-wedge-type stainless steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers:

a. B-Line Systems, Inc.; a division of Cooper Industries.
b. Empire Industries, Inc.
c. Hilti, Inc.
d. ITW Ramset/Red Head.
e. MKT Fastening, LLC.
f. Powers Fasteners.

2.7 PIPE STAND FABRICATION

A. Pipe Stands, General: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod-roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

1. Manufacturers:

a. ERICO/Michigan Hanger Co.
b. MIRO Industries.

C. Low-Type, Single-Pipe Stand: One-piece stainless-steel base unit with plastic roller, for roof installation without membrane penetration.

1. Manufacturers:

a. MIRO Industries.

D. High-Type, Single-Pipe Stand: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.

1. Manufacturers:

a. ERICO/Michigan Hanger Co.
b. MIRO Industries.
c. Portable Pipe Hangers.

2. Base: Stainless steel

3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.

4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.

1. Manufacturers:

a. Portable Pipe Hangers.

2. Bases: One or more plastic.

3. Vertical Members: Two or more protective-coated-steel channels.

4. Horizontal Member: Protective-coated-steel channel.

5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe support made from structural-steel shape, continuous-thread rods, and rollers for mounting on permanent stationary roof curb.

2.8 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, system of metal brackets, clips, and straps for positioning piping in pipe spaces for plumbing fixtures for commercial applications.

B. Manufacturers:

1. C & S Mfg. Corp.
2. HOLDRITE Corp.; Hubbard Enterprises.
3. Samco Stamping, Inc.

2.9 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

2.10 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use padded hangers for piping that is subject to scratching.

F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F pipes, NPS 4 to NPS 16, requiring up to 4 inches of insulation.
3. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
4. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
5. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30.
6. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.

G. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.

H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.

14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

K. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from hanger.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from base support.
7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from trapeze support.
8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

a. Horizontal (MSS Type 54): Mounted horizontally.
b. Vertical (MSS Type 55): Mounted vertically.
c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

L. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.

M. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.

N. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

O. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

3.2 HANGER AND SUPPORT INSTALLATION

A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.

C. Fiberglass Pipe Hanger Installation: Comply with applicable portions of MSS SP-69 and MSS SP-89. Install hangers and attachments as required to properly support piping from building structure.

D. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.

E. Fiberglass Strut System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled fiberglass struts.

F. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

G. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

H. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounting Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
2. Curb-Mounting-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. Refer to Division 7 Section "Roof Accessories" for curbs.

I. Pipe Positioning System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. Refer to Division 22 Section "Plumbing Fixtures" for plumbing fixtures.

J. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

K. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

L. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

M. Install lateral bracing with pipe hangers and supports to prevent swaying.

N. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

O. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

P. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.

Q. Insulated Piping: Comply with the following:

1. Attach clamps and spacers to piping.

    a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    c. Do not exceed pipe stress limits according to ASME B31.1 for power piping and ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

    a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
    b. NPS 4: 12 inches long and 0.06 inch thick.
    c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.

5. Insert Material: Length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make smooth bearing surface.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches

3.6 PAINTING

A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 220529

SECTION 220553 – IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following mechanical identification materials and their installation:

1. Equipment nameplates.
2. Equipment markers.
3. Equipment signs.
4. Access panel and door markers.
5. Pipe markers.
6. Stencils.
7. Valve tags

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

1.3 QUALITY ASSURANCE

A. ASME Compliance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with location of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT IDENTIFICATION DEVICES

A. Equipment Nameplates: Metal, with data engraved or stamped, for permanent attachment on equipment.

1. Data:

a. Manufacturer, product name, model number, and serial number.
b. Capacity, operating and power characteristics, and essential data.
c. Labels of tested compliances.

2. Location: Accessible and visible.
3. Fasteners: As required to mount on equipment.

B. Equipment Markers: Engraved, color-coded laminated plastic. Include contact-type, permanent adhesive.

1. Terminology: Match schedules as closely as possible.
2. Data:

a. Name and plan number.
b. Equipment service.
c. Design capacity.
d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.

3. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.

C. Equipment Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.

1. Data: Instructions for operation of equipment and for safety procedures.
2. Engraving: Manufacturer's standard letter style, of sizes and with terms to match equipment identification.
3. Thickness: 1/8 inch, unless otherwise indicated.
4. Thickness: 1/16 inch for units up to 20 sq. in. or 8 inches in length, and 1/8 inch for larger units.
5. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

D. Access Panel and Door Markers: 1/16-inch- thick, engraved laminated plastic, with abbreviated terms and numbers corresponding to identification. Provide 1/8-inch center hole for attachment.

1. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

E. Valve Tags:

1. Indoor:

a. 19 gauge brass, 1-1/2 inch round, with 1/4 inch high black pipe service letter abbreviation above 1/2 inch high black valve number. Pipe service letter abbreviation shall be in accord with legend on drawings. Valve tag attachment shall be 4 ply 0.018 copper wire meter seal or #6 solid brass bead chain with locking link.

2. Outdoor:

a. 19 gauge Type 304 stainless steel, 1-1/2” round, with 1/4 inch high pipe service abbreviation above 1/2 inch high black valve number. Pipe service letter abbreviation shall be in accord with legend on drawings. Color of valve tag shall match pipe marker color. Valve tag attachment shall be 4 ply 0.018 stainless wire meter seal or #6 Type 304 stainless steel bead chain with locking link.

3. Valve Chart Frame: Self-closing, satin-finished, extruded aluminum with glass window, 8-1/2 inch by 11 inch chart size. Provide valve chart for each mechanical and custodial room. Valve chart shall indicate valve number, location, piping system and normal operating position. Valve chart shall be provided on laminated bond paper

2.2 PIPING IDENTIFICATION DEVICES

A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.

1. Colors: Comply with ASME A13.1, unless otherwise indicated.
2. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length
3. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers extending 360 degrees around pipe at each location.
4. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.
5. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.

B. Pretensioned Pipe Markers: Precoiled semirigid plastic formed to cover full circumference of pipe and to attach to pipe without adhesive.

C. Shaped Pipe Markers: Preformed semirigid plastic formed to partially cover circumference of pipe and to attach to pipe with mechanical fasteners that do not penetrate insulation vapor barrier.

D. Self-Adhesive Pipe Markers: Plastic with pressure-sensitive, permanent-type, self-adhesive back.

E. Plastic Tape: Continuously printed, vinyl tape at least 3 mils thick with pressure-sensitive, permanent-type, self-adhesive back.

1. Width for Markers on Pipes with OD, Including Insulation, Less Than 6 Inches: 3/4 inch minimum.
2. Width for Markers on Pipes with OD, Including Insulation, 6 Inches or Larger: 1-1/2 inches minimum.

2.3 STENCILS

A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; minimum letter height of 1-1/4 inches for ducts; and minimum letter height of 3/4 inch for access panel and door markers, equipment markers, equipment signs, and similar operational instructions.

1. Stencil Material: Brass.
2. Stencil Paint: Exterior, gloss, acrylic enamel black, unless otherwise indicated. Paint may be in pressurized spray-can form.
3. Identification Paint: Exterior, acrylic enamel in colors according to ASME A13.1, unless otherwise indicated.

PART 3 - EXECUTION

3.1 APPLICATIONS, GENERAL

A. Products specified are for applications referenced in other Division 22 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

3.2 EQUIPMENT IDENTIFICATION

A. Install and permanently fasten equipment nameplates on each major item of plumbing equipment that does not have nameplate or has nameplate that is damaged or located where not easily visible. Locate nameplates where accessible and visible. Include nameplates for the following general categories of equipment:

1. Pumps, compressors, and similar motor-driven units.

B. Install equipment markers with permanent adhesive on or near each major item of mechanical equipment. Data required for markers may be included on signs, and markers may be omitted if both are indicated.

1. Letter Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
2. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.
3. Locate markers where accessible and visible. Include markers for the following general categories of equipment:

    a. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
    b. Meters, gages, thermometers, and similar units.
    c. Pumps, compressors, and similar motor-driven units.
    d. Tanks and pressure vessels.
    e. Strainers, filters, and similar equipment.

C. Stenciled Equipment Marker Option: Stenciled markers may be provided instead of laminated-plastic equipment markers, at Installer's option, if lettering larger than 1 inch high is needed for proper identification because of distance from normal location of required identification.

D. Install equipment signs with screws or permanent adhesive on or near each major item of mechanical equipment. Locate signs where accessible and visible.

1. Identify mechanical equipment with equipment markers in the following color codes:

    a. Green: For cooling equipment and components.
    b. Yellow: For heating equipment and components.
    c. Orange: For combination cooling and heating equipment and components.

2. Letter Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
3. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.
4. Include signs for the following general categories of equipment:

    a. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
    b. Pumps, compressors, chillers, condensers, and similar motor-driven units.
    c. Tanks and pressure vessels.
    d. Strainers, filters, humidifiers, water-treatment systems, and similar equipment.

E. Stenciled Equipment Sign Option: Stenciled signs may be provided instead of laminated-plastic equipment signs, at Installer's option, if lettering larger than 1 inch high is needed for proper identification because of distance from normal location of required identification.

F. Install access panel markers with screws on equipment access panels.

3.3 PIPING IDENTIFICATION

A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.

1. Pipes with OD, Including Insulation, Less Than 6 Inches: Pretensioned pipe markers. Use size to ensure a tight fit.
2. Pipes with OD, Including Insulation, Less Than 6 Inches: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, 1-1/2 inches wide, lapped at least 1-1/2 inches at both ends of pipe marker, and covering full circumference of pipe.
3. Pipes with OD, Including Insulation, 6 Inches and Larger: Shaped pipe markers. Use size to match pipe and secure with fasteners.
4. Pipes with OD, Including Insulation, 6 Inches and Larger: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least 1-1/2 inches wide, lapped at least 3 inches at both ends of pipe marker, and covering full circumference of pipe.

B. Stenciled Pipe Marker Option: Stenciled markers may be provided instead of manufactured pipe markers, at Installer's option. Install stenciled pipe markers complying with ASME A13.1 on each piping system.

1. Identification Paint: Use for contrasting background.
2. Stencil Paint: Use for pipe marking.

C. Locate pipe markers and color bands where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior nonconcealed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and nonaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced markers.

D. Valve Tags:

1. Valve tag description shall include system abbreviation as shown on plans and sequential numbering.
2. Provide valve tags on all valves, exposed or concealed.
3. Attach valve tag to stem of each valve.
4. Provide a marker for each valve located above lift-out tile ceiling or hard ceiling with access panel as listed in section 2.1.D. All markers shall adhere to ceiling grid and have same data as the valve tag.

3.4 ADJUSTING

A. Relocate mechanical identification materials and devices that have become visually blocked by other work.

3.5 CLEANING

A. Clean faces of mechanical identification devices and glass frames of valve schedules.

END OF SECTION 220553

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SECTION 223000 – PLUMBING EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Basic Requirements: Provisions of Section 23 05 01, BASIC MECHANICAL REQUIREMENTS, are a part of this Section.

1.2 SUMMARY

A. General: Provide plumbing equipment including piping, valves, overflow drain pans, relief valves, fitting and appurtenances.

1.3 SUBMITTALS

A. General: Provide shop drawings and manufacturer's data sheets for the following items:

1. Manufacturers Literature:

a. Dimensional outline drawing of each electric water heater showing the location of all connections and the wattage, voltage and phase.

1.4 APPLICABLE STANDARDS

A. General: All equipment, material, accessories, methods of construction and reinforcement, finish quality, workmanship and installation shall be in compliance Section 23 05 01.

B. Industry Standards: Where compliance with an industry, society or association standard is specified or indicated, certification of such compliance shall be submitted with the shop drawings.

C. ASHRAE Requirements: The heat loss through the domestic hot water heater exterior jacket, and the unit operating efficiency, shall meet ASHRAE Standard 90.1 requirements.

PART 2 - PRODUCTS

2.1 GENERAL

A. Manufacturers: Refer to Section 23 05 01.

2.2 ELECTRIC WATER HEATERS

A. Light Commercial Tank Type:

1. Tank: Heater shall be constructed with steel tank constructed to 125 psi working pressure, 300 psi test pressure and lined with borosilicate glass bonded to tank. Glass lining to be baked at 1600 degrees F. to assure a molecular-interchange between tank and lining. Tank to be protected against electrolytic activity with replaceable factory installed anode rod and factory installed dielectric nipples.

2. Temperature Control: Water heater to be provided with fully adjustable temperature controls and automatic high limit control. Unit shall have ASME approved temperature and pressure relief valve properly sized for btu capacity of the unit installed.

3. Insulation: Water heater shall be insulated to ASHRAE 90.1 standards and jacketed with manufacturers standard heavy steel jacket.

4. Heating Element: Water heater shall also feature 98 percent efficient immersion type heating elements. Zinc plated copper sheathed elements shall be provided.

5. Relief valve: Provide ASME rated and UL listed temperature and pressure relief valve. Temperature setting shall be 210 degrees F. and the pressure setting shall be 125 psig unless otherwise indicated.

6. Drain: Provide storage tank drain and drain pan fabricated of minimum 18 gauge galvanized steel with a minimum lip of 1-1/2 inches, and provided with a drain connection piped to the nearest floor drain unless otherwise indicated.

7. Testing: All units to be UL tested and UL listed for service as a domestic water heater for voltage inputs as indicated on the drawings.

8. Warranty: Water heater shall carry a limited factory warranty of 3 years. Owner to be provided with copy of warranty and operations manuals as distributed by manufacturer.

9. Manufacturer:
   a. A. O. Smith
   b. State Industries
   c. Rheem

B. Thermostat-Control, Instantaneous Electric Water Heaters: Comply with UL 499 for tankless electric (water heater) heating appliance.

1. Manufacturers:

   a. Eemax, Inc. or approved equal.

2. Construction: Copper piping or tubing complying with NSF 61 barrier materials for potable water, without storage capacity.

a. Connections: ASME B1.20.1 pipe thread.
b. Pressure Rating: 150 psig.

c. Heating Element: Resistance heating system.

d. Temperature Control: Thermostat.

e. Safety Control: High-temperature-limit cutoff device or system.

f. Jacket: Aluminum or steel with enameled finish or plastic.

g. Instantaneous water heater to be furnished and installed according to all governing authorities and with minimal sized disconnect.

3. Support: Bracket for wall mounting.

C. Circulator Pumps: Refer to plans for performance data.

D. Thermal Expansion Tanks: Inline and floor models to be installed and supported according to IBC and all governing authorities. Support inline tanks from wall brackets to prevent movement or damage.

PART 3 - EXECUTION

3.1 GENERAL

A. Installation: Install all equipment where indicated, in accordance with manufacturer's published installation instructions, with recommended clearances provided for service and maintenance. Equipment placement shall be essentially as shown on drawings: however, actual location shall be verified using field measurements and data relating to equipment actually approved for installation on this project.

3.2 WATER HEATERS

A. Piping: Provide shut-off valves on both the incoming cold water and leaving hot water supply piping. Heat trap shall be installed in the hot water supply piping.

B. Relief Valve Discharge: The discharge from the temperature/pressure relief valve shall be piped full-size separately to approved terminal as provided for safety pan drain terminals but in no case shall the discharge from a relief valve be trapped.

C. Vacuum Breaker: Cold water supply shall provided with a vacuum breaker.

D. Union Connections: Provide unions to facilitate replacement of the equipment.

E. Drain Pan: The water heater drain pan shall be drained by an indirect waste pipe no less than 1 inch in diameter or the diameter of the outlet of the required relief valve whichever is larger. The pan drain shall extend full-size and terminate over a suitably located

indirect waste receptor, floor drain or extend to the exterior of the building and terminate no less than 6 inch or more than 24 inch above grade.

F. Floor Mounted Water Heaters: All floor mounted water heaters shall have their drain pan set on a 4 inch high housekeeping pad. Refer to Section 23 05 03.

G. Provide wall bracket for wall mounted water heaters. Support shall be rated for weight of water heater, water in system, and accessories.

H. Water heaters shall be set at 140ºF. Hot water supplies to hand sinks and lavatories shall not exceed 105ºF. Refer to floor plans for mixing valve locations. Note that instantaneous electric water heaters directly serving hand sinks or lavatories shall be set at 105ºF leaving water temperature. Note water heater serving emergency eye wash shall be set at 90ºF maximum.

I. Install ball valve on the suction and discharge pipe of the circulator pump.

END OF SECTION 223000

SECTION 224000 – PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Basic Requirements: Provisions of Section 23 05 01, BASIC MECHANICAL REQUIREMENTS, are a part of this Section.

1.2 SUMMARY

A. General: Provide plumbing fixtures, traps, tailpieces, trim, devices and appurtenances as indicated.

1.3 SUBMITTALS

A. General: Provide shop drawings and manufacturer's data sheets for the following items:

1. Manufacturers Literature:

a. Dimensional outline drawing for each plumbing fixture including fittings and trim.

b. Outline drawings and data sheets for the following items of plumbing equipment:

1) Each type of floor drain or floor sink including trap primer.
2) Shower pan material.
3) Each type of roof drain.
4) Each cleanout and cleanout covers including wall access cover.
5) Water hammer arrester including capacity and pipe connection size.

2. Installation Instructions:

a. Manufacturer's printed installation instructions including copies shipped with each fixture.

b. Mounting templates for fixtures.

c. Pressure and fixture unit capacity for water hammer arresters.

3. Maintenance Instructions: Exploded parts list for each item.

1.4 APPLICABLE STANDARDS

A. General: All equipment, material, accessories, methods of construction and reinforcement, finish quality, workmanship and installation shall be in compliance with Section 23 05 01.

B. Access for the Disabled: Fixtures indicated to provide disabled access shall be designed, manufactured and installed in accordance with ANSI 117.1.

C. ASSE: Fixtures and devices shall comply with the standards of the American Society of Sanitary Engineers, where required.

D. ADA: Fixtures, devices and installation clearances and heights shall comply with the requirements of the Americans with Disabilities Act (ADA).

E. PDI: Fixtures and devices shall comply with the standards of the Plumbing and Drainage Institute, where required.

PART 2 - PRODUCTS

2.1 GENERAL

A. Manufacturer: Refer to Section 23 05 01.

B. Material: Fixtures shall be white vitreous china unless otherwise indicated. Where enameled iron fixtures are specified, they shall be furnished with acid resisting enamel.

C. Quality: Plumbing fixtures shall be "First Quality" as defined and set forth in Commercial Standard CS77-28 as promulgated by the U.S. Department of Commerce. Fixture fittings shall comply with ANSI/ASTM A112.18.1M. Plumbing trim for water closet bowls, tanks and urinals shall comply with ANSI/ASTM A112.19.5.

D. Similar Character and Design: Fixtures and fittings of a similar type shall be from a single manufacturer.

E. Vitreous China Fixtures: Vitreous china fixtures shall comply with ANSI A112.19.2M.

F. Enameled Cast Iron Fixtures: Enameled cast iron fixtures shall comply with ANSI A112.19.1M.

G. Porcelain Fixtures: Porcelain enameled steel fixtures shall comply with ANSI A112.19.4M.

H. Exposed Metal: Exposed metal shall be polished chromium on either brass or bronze, unless otherwise indicated. Supply valves shall have renewable seats and discs. Hot and cold water supply to fixtures shall be provided with stops. Provide P-trap with cleanout for each lavatory and sink except as indicated.

I. Concealed Carriers: Provide a cast iron or steel concealed arm, floor-mounted carrier with cast iron feet and steel uprights to support all wall mounted lavatories, sinks, urinals, and water closets. Carriers shall comply with ANSI A112.6.1.M and shall have adjustable support plates, alignment truss, and mounting fasteners. Floor mounted carriers shall withstand an applied vertical load of 250 pounds on the front of the fixture indefinitely without breaking or permanently deforming. Supports and carriers shall have adjustments capable of permitting field alignment to allow for actual site conditions.

J. Trap Guard: Elastometric tubing device molded to prevent sewer gasses from escaping through P-Traps. Trap guard shall be ASSE 1072 listed.

K. Vacuum Breakers: Vacuum breakers shall be full-line size, bronze with rough chrome plating, or polished chrome plating where exposed, full-line size, and shall conform to ASSE 1001or 1020 as applicable.

L. Refer to Plumbing Fixture Schedule on plans.

2.2 FLOOR DRAINS

A. General: Floor drains and floor sinks shall be cast iron, shall comply with ANSI/ASME A112.21.1M, and shall be adjustable to accommodate the finished floor. Strainer size shall be as recommended by the manufacturer unless otherwise indicated. Strainers shall be polished nickel alloy or polished brass. Provide trap guard and flashing flange or clamp, unless otherwise indicated or required.

B. Floor Sinks: Floor sinks shall have cast iron body with acid-resisting enameled interior. Provide with nickel-bronze grate, trap guard, and nickel-bronze dome strainer unless otherwise indicated.

2.3 CLEANOUTS AND CLEANOUT ACCESS COVERS

A. Size: Cleanouts shall be at least the same nominal pipe size as the pipe to which they are connected, to a maximum of 6 inch diameter, unless otherwise indicated.

B. Material: Cleanouts shall comply with ANSI A112.36.2M and shall be water- and gas-tight cast iron construction with adjustable housing to accommodate finished floor or grade elevation. Cleanouts in waterproofed floors shall have a flashing flange and clamp device. Cleanouts shall have a countersunk internal bronze plug and scoriated nickel-bronze removable cover; wall cleanouts shall have polished stainless steel cover specifically manufactured for the wall finish at each location. Floor cleanouts for floors with finish coverings shall have the top recessed for tile or carpet, with a cleanout marker, manufactured for the finished floor material.

C. Access Cover: Access covers for concealed wall cleanouts shall be nickel-bronze with scoriated hinged cover or round stainless steel cover with countersunk machine threaded center screw, unless otherwise indicated.

2.4 WATER HAMMER ARRESTER

A. Manufactured Water Hammer Arrester: Water hammer arresters shall be designed, manufactured, tested and certified in accordance with PDI Standard WH201. Arresters shall be Type L copper tube construction, with a piston and heat sink. The piston shall have pressure lubricated O-rings separating the compressed air charge from the flowing fluid to dissipate the kinetic energy generated in the piping system. Each arrester shall be sized according the table and shall have a male sweat connection. Unless specifically indicated otherwise, calculated or field constructed air chambers are not acceptable.

1. Manufacturer: PPP, Inc., Sioux Chief or approved substitution.

PART 3 - EXECUTION

3.1 GENERAL

A. Vacuum Breakers: Where not provided as an integral part of a device or fixture, provide vacuum breakers at each fixture to prevent back-siphoning.

B. Emergency Eye Wash: Provide an isolation valve for each eye wash station, whether indicated or not. Isolation valve shall be OS&Y type only.

1. Provide a flow switch in the water supply for alarm.

C. Piping: Plumbing piping to fixtures shall be secured to the wall framing system prior to installation of the wall surface material to assure a solid installation which will not move. Fixture piping which can be moved shall be removed and re-secured to the wall structure; replacement of the wall, finishes, trim, etc. shall be included at no cost to the Owner.

D. Clearances: Install fixtures in accordance with manufacturer's data, with sufficient clearances to coordinate with accessories, specialties and equipment.

E. Mop Sinks: Unless otherwise indicated, mop sinks or basins shall be floor mounted and sealed watertight, at walls and seams.

3.2 CLEANOUTS AND CLEANOUT ACCESS COVERS

A. Exterior Cleanouts: Extend exterior cleanouts to finished grade. Provide a concrete pad 18 inches by 18 inches, 6 inches thick around cleanout; slope top down approximately 2 inches from the cleanout to edge of pad so that edge of pad is flush with finished grade.

B. Locations: Cleanouts shall be provided at not more than 50 feet apart in horizontal drainage lines. Cleanouts shall be provided at each change of direction of 45 degrees or more. Cleanouts shall be provided in vertical sanitary and storm water piping, with the centerline not more than 18 inches above the finished floor level, at each floor with a horizontal offset or horizontal branch connection.

3.3 WATER HAMMER ARRESTERS

A. General: Install water hammer arresters on both hot and cold water piping in accordance with manufacturer's recommendations. Water hammer arresters shall be installed at each valve-operated plumbing fixture, or at the end of piping branches serving a battery of valve-operated fixtures. In addition, water hammer arresters shall be installed at each solenoid valve, at each remotely-operated valve, or at each quick-closing valve as defined by PDI WH-201, as close to the point of quick closure as possible.

3.4 INSULATION OF ACCESSIBLE LAVATORY EXPOSED PIPING

A. General: Insulate hot water supply and waste lines for accessible lavatories with 1/2 inch thick elastomeric or fiberglass insulation. All joints shall be sealed and provided with a white finish.

3.5 DRAINS

A. General: Drains shall be located at the low point of indicated slopes, or 1/2 inch below the finished surface. Install to prevent ponding around the perimeter of the drain. Drains shall be installed with trap guards.

3.6 FIXTURE INSTALLATION

A. General: Obtain mounting templates and dimensions prior to roughing-in plumbing connections. Mount fixture on carrier which is bolted to the building structure with through-bolts or pre-set inserts. Floor-mounted fixtures shall have supports, blocking or a non-shrink grout setting bed to prevent movement or flexing. Floor-mounted, wall mounted and countertop fixtures shall be sealed watertight with a flexible, non-permeable caulk or mastic. Provide stainless steel escutcheons at each water supply and waste piping penetration of a wall or cabinet; caulk each escutcheon. Adjust all fixtures level and plumb at proper mounting height.

B. Rough-In: During rough-in, water and waste stub-outs shall be located to prevent gaps between the fixture and the finished wall, and to allow exposed pipe to be installed straight and plumb from the stub-out to the fixture. Continuously cover wall openings and open pipe ends to prevent construction debris from entering.

C. Special Fixtures: For equipment to be connected later or under a separate contract, provide valved and capped water lines; provide floor drains, open site drains, or capped water connections as indicated or required.

D. Fixture Connections: Provide valve cocks or stops in pressure piping to fixtures in lines 1/2 inch or smaller; provide gate valves in piping 3/4 inch and larger. Provide a water seal trap with each fixture (including floor drains and floor sinks) whether indicated or not. Drains shall be sized as indicated or required but in no case less than 1-1/2 inch pipe size.

END OF SECTION 224000

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SECTION 230501 - BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including Contractual Conditions and other Specification Sections, apply to this Section.

1.2 SUMMARY

A. Mechanical systems, equipment, devices and accessories shall be installed, finished, tested and adjusted for continuous and proper operation. Any apparatus, material or device not shown on the Drawings but mentioned in these Specifications, or vice versa, or any incidental accessories necessary to make the project complete and operational in all respects, shall be provided. Include all materials, equipment, supervision, operation, methods and labor for the fabrication, installation, start-up and tests necessary for complete and properly functioning systems.

1.3 QUALITY ASSURANCE

A. Code Compliance: Comply with all rules, laws, statutes, regulations, building codes, and the amendments of local, state and federal governments by the authorities having jurisdiction.

B. ADA: Comply with the requirements of the Americans with Disabilities Act (ADA).

C. NFPA: Comply with the National Fire Codes compiled by the National Fire Protection Association.

D. Conform in strict compliance to the current editions of Florida Building Code; Florida Mechanical Code; Florida Plumbing Code; International Fuel Gas Code; and the amendments to these codes which are enforced by the local authority having lawful jurisdiction.

1.4 DRAWINGS AND SPECIFICATIONS

A. Equipment Placement: The drawings are diagrammatic, intended to show general arrangement, capacity and location of various components, equipment and devices. Reasonable changes in locations ordered by the Engineer prior to the installation may be made at no additional cost.

B. Drawing Scale: Due to the small scale of the drawings, and to unforeseen job conditions, all required offsets, transitions and fittings may not be shown but shall be provided at no additional cost.

1.5 DEFINITIONS

A. Concealed: When standing inside a finished room, insulated or non-insulated piping or ductwork not visible after installation, such as inside a chase or above a ceiling.

B. Exposed: When standing inside a finished room, insulated piping or ductwork is visible after installation, such as inside an equipment room or an air handling unit room.

C. Protected: The surface of insulated or non-insulated piping or ductwork on the exterior of the building but protected from direct exposure to the weather by an overhang, eave, in an unconditioned parking garage or building crawl space.

D. Unprotected: The surface of insulated on non-insulated piping or ductwork on the exterior of the building and exposed to the weather.

1.6 SUBMITTALS

A. Shop Drawings: Shop drawings include piping system layouts, ductwork layouts, fabrication and installation drawings of supports and anchorage for mechanical materials and equipment, and coordination drawings. Shop drawings also include proposed equipment layouts, drawn to scale, indicating that proposed equipment will fit into allotted space, including service access, connections, etc.

1. Piping Systems: Submit shop drawings for piping systems drawn at a minimum scale of ¼ inch per foot to verify clearances and equipment locations. Show required maintenance and operational clearances. Include the following:

a. Architectural and structural backgrounds with room names and numbers, including but not limited to plans, sections, elevations and details.
b. Fabrication and erection dimensions.
c. Arrangements and sectional views.
d. Details, including complete information for making connections to equipment.
e. Descriptive names of equipment.
f. Modifications and options to standard equipment required by Contract Documents.

2. Ductwork: Submit shop drawings for duct systems at a minimum scale of 1/4 inch per foot to verify clearances and equipment locations. Show required maintenance and operational clearances. Include the following:

a. Architectural and structural backgrounds with room names and numbers, etc., including but not limited to plans, sections, elevations, details, etc.
b. Fabrication and erection dimensions.
c. Arrangements and sectional views.
d. Details, including complete information for making connections to equipment.
e. Materials and finishes.
f. Descriptive names of equipment.

g. Modifications and options to standard equipment required by Contract Documents.

3. Coordination Drawings: Submit coordination drawings including detailed drawings showing locations and positions of all Architectural, structural, electrical and mechanical elements. Drawings shall be minimum ¼ inch per foot for each mechanical equipment room, mechanical riser, or chase. All other areas shall be a minimum 1/8 inch per foot.

B. Product Data: Product data includes the manufacturer's printed literature.

C. Performance Data: Provide performance data, wiring and control diagrams.

D. Installation Instructions: Installation instructions include detailed information, from the manufacturer, indicating specific installation requirements, instructions, and recommendations. Generic installation instructions are not acceptable. Instructions shall be the same as those included with the product when it is shipped from the factory.

E. Written Operating Instructions: Operating instructions shall be the manufacturer's written operating instructions for the specified product. If the instructions cover more than one model or type of product they shall be clearly marked to identify the instructions that cover the product delivered to the project.

F. Maintenance Instructions: Maintenance instructions shall be the manufacturer's printed instructions and parts lists for the equipment furnished. If the instructions cover more than one model or type of equipment they shall be marked to identify the instructions for the furnished product.

1.7 MANUFACTURER'S EQUIPMENT AND SYSTEMS STARTUP AND PERFORMANCE CHECKOUT

A. At the completion of installation, a factory trained representative of the equipment manufacturer shall provide start-up and checkout services. The manufacturer's representative shall examine performance information and check the equipment in operation.

1.8 INSTRUCTION TO THE OWNER

A. General: Instructions to the Owner shall be accomplished by representatives of the manufacturers involved. Allow time for complete coverage of all operating procedures. Provide classroom instruction and field training in the design, operation and maintenance of the equipment and troubleshooting procedures. Explain the identification system, operational diagrams, emergency and alarm provisions, sequencing requirements, seasonal provisions, security, safety, efficiency and similar provisions of the systems. On the date of substantial completion, turn over the prime responsibility for operation of the mechanical equipment and systems to the Owner's operating personnel.

B. Training Period: Training period shall encompass a minimum of 4 hours of classroom and 4 hours of hands-on instructions with a maximum period of 4 hours per day.

C. Scheduling: Submit any remaining required items for checking at least one week before final inspection of the work. When submittal items are found acceptable, notify the Owner, in writing, that an "Instruction Conference" may proceed. Conference will be scheduled by the Owner. After the conference, copies of a memo certifying that the "Instruction Conference" and "Completed Demonstration" have been made will be signed by the Owner and the instructors, and one copy will be inserted in each submittal binder.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specified Products: Manufacturer's names and product model numbers indicated on the drawings and in these specifications establish the type, style, quality, performance, and sound rating of the desired product. Listing of other manufacturers indicates that their equivalent products would be acceptable if they meet the specification requirements, the specific use and installation shown on the drawings, including space and clearance requirements, and the energy consumption and efficiency of the specified product.

B. Space Requirements: All manufactured products furnished on this project must have the required space and service areas indicated in the manufacturer's printed literature or shown on their approved shop drawings. When the manufacturer does not indicate the space required for servicing the equipment, the space shown on the drawings or as required by the Engineer must be provided.

2.2 MATERIAL AND EQUIPMENT

A. General: Material and equipment used shall be produced by manufacturers regularly engaged in the production of similar items, and with a history of satisfactory use as judged by the Engineer.

B. Specified Equipment: Equipment shall be the capacity and types indicated. Equipment and material furnished shall be the manufacturer's standard item of production unless specified or required to be modified to suit job conditions. Sizes, material, finish, dimensions and the capacities for the specified application shall be published in catalogs for national distribution. Ratings and capacities shall be certified by a recognized rating bureau. Products shall be complete with accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.

C. Compatibility: Material and equipment of one and the same kind, type or classification and used for identical or similar purposes shall be made by the same manufacturer. Where more than one choice is available, select the options which are compatible with other products already selected. Compatibility is a basic general requirement of product selection.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A. General: Personnel who install materials and equipment shall be qualified by training and experience to perform their assigned tasks.

B. Performance: Material and equipment installations not in compliance with the Contract Documents, or installed with substandard workmanship in the opinion of the Engineer, shall be removed and reinstalled.

3.2 CLEANING AND PROTECTION

A. Housekeeping: Keep interiors of duct and pipe systems clean and free from dirt, rubbish and foreign matter. Close open ends of piping and ductwork at all times throughout the installation. Install 30% efficient filter media over each return air grille and open return duct opening; change media regularly during construction when dirty to keep duct interiors clean. Prevent dust, debris and foreign material from entering the piping and ductwork.

B. Equipment Protection: Protect fan motors, switches, equipment, fixtures, and other items from dirt, rubbish and foreign matter. Do not operate air handling equipment if the building is not clean or if dust can enter the coils or the fan housings.

C. Equipment Cleaning: Thoroughly clean equipment and entire piping systems internally upon completion of installation and immediately prior to Submittal Completion. Open dirt pockets and strainers, blow down each piping system and clean strainer screens of accumulated debris. Remove accumulated dirt, scale, oil and foreign substances. Thoroughly wipe clean internal surfaces of ductwork and air handling units prior substantial completion. Refer to Section 23 21 13, Pipe and Fittings, for detailed requirements for piping systems' flushing and cleaning.

D. Fixture Cleanup: Remove temporary labels, stickers, etc., from fixtures and equipment. Do not remove permanent name plates, equipment model numbers, ratings, etc.

E. Filter Replacement: Provide filters, with the same efficiency rating as required for the final installation, for the protection of the air moving equipment and ductwork continuously throughout the construction phase. Provide a new set of clean filters for the test and balance of the air side equipment.

F. Protection of Finished Installation: Where installation is required in areas previously finished by other trades, protect the area from marring, soiling or other damage.

3.3 CORRECTION OF WORK

A. General: At no additional cost to the Owner, rectify discrepancies between the actual installation and Contract Documents when in the opinion of the Testing and Balancing Agency (T&B Agency) or the Engineer the discrepancies will affect system balance and performance.

B. Drive Changes: Include the cost of all pulley, belt, and drive changes, as well as balancing dampers, valves and fittings, and access panels to achieve proper system balance recommended by the T&B Agency.

3.4 COORDINATION AND ASSISTANCE

A. General: Provide all labor, equipment, tools and material required to operate the equipment and systems necessary for the testing and balancing of the systems and for the adjustment, calibration and repair of all electric automated control devices and components. These services shall be available on each working day during the period of final testing and balancing.

B. Drawings and Specifications: Provide to the T&B Agency a complete set of project record drawings and specifications and an approved copy of all HVAC shop drawings and equipment submittals. The T&B Agency shall be informed of all changes made to the system during construction, including applicable change orders.

C. Coordination: Coordinate the work of all trades and equipment suppliers to complete the modifications recommended by the T&B Agency and accepted by the Engineer. Cut or drill holes for the insertion of air measuring devices as directed for test purposes; repair to as-new condition, inserting plastic caps or covers to prevent air leakage. Repair or replace insulation and re-establish the integrity of the vapor retardant.

3.5 PREPARATIONS FOR PERFORMANCE VERIFICATION

A. Verification: Prior to commencement of balancing by the T&B Agency, verify the following in writing:

1. Air filters have been replaced and are clean.
2. Linkages between dampers and their actuators are secure, non-overloading and non-binding.
3. Ductwork specialties are in their normal operating positions.
4. Fans are operating at the correct rotation and specified RPM.
5. Ductwork has been pressure tested and accepted.
6. Operating safety features (such as thermal overloads, firestats, freezestats, smoke detectors and relief valves), are installed and fully functional.
7. Equipment has been lubricated and can be operated without damage.
8. Systems are operational and complete.
9. No latent residual work remains to be completed.

3.6 PROTECTION OF MATERIALS AND EQUIPMENT

A. Requirements: Do not store fiberglass insulation or any equipment within the building until it has been "dried in". If dry space is unavailable and the insulation and equipment must be installed or stored before the building is "dried in" and completely enclosed, provide polyethylene film cover for protection.

B. Replacement of Damaged Stored Material and Equipment: Any material and equipment that has been wet or otherwise damaged prior to installation shall be replaced with new material regardless of the condition of the material and equipment at the time of installation.

C. Repair of Damaged Installed Material and Equipment: After installation correct or repair dents, scratches and other visible blemishes. At the direction of Engineer replace or repair to "as new" condition equipment which has been damaged during construction.

3.7 COORDINATION OF SERVICES

A. Interruption of existing services: Provide shutoff valves at points of interconnection to minimize downtime.

END OF SECTION 230501

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SECTION 230502 - ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Basic Requirements: Provisions of Section 23 05 01, BASIC MECHANICAL REQUIREMENTS are part of this Section.

1.2 SUMMARY

A. General: Provide electric motors and related electric material and equipment required for all mechanical work.

1.3 APPLICABLE STANDARDS

A. Requirements: The electrical equipment, components and installation shall comply with the requirements of the following regulations:

1. NEC: National Electrical Code (NFPA 70).
2. NEMA: National Electric Manufacturer's Association Standard MG-2.

PART 2 - PRODUCTS

2.1 ELECTRIC MOTOR

A. Manufacturers:

1. General Electric
2. Westinghouse
3. Baldor Electric Co.
4. Emerson
5. Lincoln

B. General:

1. Provide motors for continuous duty conditions in which they will be required to perform; i.e., general purpose, splashproof, explosion proof, standard load, high torque, or any other special type as required by the equipment motor manufacturer's recommendations. Unless otherwise indicated or required, motors shall be open drip-proof type.
2. Motors installed outdoors shall be totally enclosed fan cooled (TEFC) type.
3. Motor enclosures shall be of the type recommended by the equipment manufacturer for the specific application.

4. All motors shall be furnished for starting in accordance with the electric utility company's requirements and shall be compatible with the motor starter and driven load. Motors shall not exceed full-rated nameplate load when operated at any point along the driven equipment's characteristic performance curve. The motor service factor shall not be used to justify exceeding nameplate amperage.
5. Sound power levels for motors shall be no greater than the guidelines recommended by NEMA MG 1-12.49. A motor which generates excessive noise within an occupied area of the building shall be replaced with a quieter operating motor at no additional cost to the Owner.
6. Verify the circuit voltage and phase being furnished to the motor. All motors shall be 1750 rpm unless noted otherwise. Motors shall operate with electrical input voltage variations of plus or minus 1 percent of nameplate rating or frequency variations of plus or minus 5 percent of nameplate rating.

C. Design: Provide NEMA Design B for normal starting torque with Standard MG1-12.42 Class B insulation unless noted otherwise or required by the equipment on which the motor is being used, except that motors for variable-speed service shall have Class F insulation. Motors shall be designed for operation in 40 degree C. ambient at 1.15 service factor on sine wave power at the base voltage and frequency and shall have all copper windings. Motors shall meet or exceed the locked-rotor (starting) and breakdown (maximum) torques for the NEMA rating. Locked rotor current shall not exceed 6 times full-load current. Motor current density and heating characteristics shall be such that the motor insulation will not fail if subjected to locked-rotor current for 20 seconds.

D. Efficiency: Motors 1 horsepower and larger shall be high efficiency design. Nominal efficiency of each motor shall meet or exceed the value listed below when tested in accordance with NEMA MG 1-12.54.1 and shall be labeled on the motor nameplate in accordance with NEMA MG 1.12.54.2. High-efficiency motors shall be different from the manufacturer's standard product through the use of premium materials, design and improved manufacturing processes to reduce motor losses.

TABLE - MOTOR EFFICIENCY

	2-Pole 3600 RPM		4-Pole 1800 RPM	
HP	Nominal	Minimum	Nominal	Minimum
1.0	82.5	81.5	82.5	81.5
1.5	84.0	82.5	84.0	82.5
2.0	84.0	82.5	84.0	82.5
3.0	86.5	85.5	87.5	6.5
5.0	87.5	86.5	87.5	86.5
7.5	88.5	87.5	89.5	88.5
10	89.5	88.5	89.5	88.5

E. Single Phase: Single phase motors for hard starting applications including air compressors and outdoor installations shall be capacitor start/induction run or capacitor start/capacitor run type designed for the application. Motors for fans and pumps located indoor may be split phase with permanently lubricated sealed ball bearings and shall be selected for quiet operation. Motors 1/8 horsepower and below may be shaded pole type with permanently sealed bearings.

2.2 MOTOR STARTERS

A. Compliance: Motor starters included as an integral part of a factory pre-wired control panel shall be provided by the manufacturer of the equipment it serves and shall comply with the requirements of Division 26.

B. Overload Protection: Unless otherwise indicated, all 3 phase motor starters shall be provided with thermal overload relays on each phase sized in accordance with the actual nameplate full load ampere rating. Single phase motors shall be furnished with built-in thermal protection.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install material and equipment in accordance with details shown on the drawings, submittals drawings and manufacturer's instructions.

3.2 SCHEDULED HORSEPOWER

A. Nominal Size: The horsepower scheduled or specified are those nominal sizes estimated to be required by the equipment when operating at specified duties and efficiencies. In the case of pumps and fans, these motors shall be non-overloading at any point of the performance curve.

B. Minimum Size: Motor horsepowers shall not be reduced from the scheduled size regardless of the requirements of the selected or submitted equipment.

C. Increased Size: If the actual motor horsepower for the equipment furnished is larger than the scheduled size indicated, the proper size feeder, breaker, starter, etc. shall be provided at no additional cost to the Owner.

3.3 WIRING

A. Power: All power wiring including safety disconnect switches, motor starters, over-current protection, connection to equipment, etc. shall be installed according to the requirements of Division 26, ELECTRICAL.

B. Interlock: Unless otherwise noted, all interlock wiring, such as remote line voltage thermostats, fan speed controllers, etc. shall be installed by the supplier of that equipment. Interlock wiring shall be installed according to the requirements of Division 26, ELECTRICAL.

C. Control: All control wiring exposed in mechanical equipment rooms, fan rooms, return air plenums, etc. shall be in conduit. Low voltage control wiring may be installed without conduit in return air plenums provided the cable is plenum rated and the installation is acceptable to the authority having jurisdiction.

3.4 WEATHER PROTECTION

A. Wiring: All electrical wiring exposed to the weather or in damp locations shall be enclosed in weatherproof fittings as required in Division 26, ELECTRICAL.

B. Enclosures: Enclosures for electrical equipment shall be NEMA 3R unless indicated otherwise.

END OF SECTION 230502

SECTION 230503 – BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Provisions of Section 23 05 01, BASIC MECHANICAL REQUIREMENTS, are part of this Section.

1.2 SUMMARY

A. Materials listed herein are general mechanical materials to be used for Division 23 sections of the specifications unless noted otherwise.

1.3 SUBMITTALS

A. Manufacturers Literature:

1. Product data for pitch pockets or pipe seals through roofing.
2. Access doors and panel data for each type of unit indicated.
3. Piping system identification markers and tags including a representative sample of each type.
4. Each type of pipe hanger and supporting device.
5. Curbs for roof mounted air intake and relief vents.

B. Valve tag list framed under glass and mounted in the mechanical equipment room.

1.4 APPLICABLE STANDARDS

A. ANSI: Color coding for piping systems shall comply with The American National Standards Institute, ANSI A13.1, latest edition, "Scheme for the Identification of Piping Systems".

B. NFPA: NFPA 704, Standard System for the Identification of the Fire Hazards of Materials.

PART 2 - PRODUCTS

2.1 GENERAL

A. Materials and equipment shall be products which will meet with the acceptance to the authority having jurisdiction. Where acceptance is contingent upon having the products examined, tested and certified by Underwriters Laboratories or other recognized testing laboratory, the product shall be so examined, tested and certified.

2.2 HOUSEKEEPING PADS AND EQUIPMENT SUPPORTS

A. General: Pads and supports shall extend a minimum of 4 inches and a maximum of 8 inches beyond the base or supporting member in all directions. It is the intent not to have the pad extend under the entire piece of equipment unless that equipment is located on the exterior of the building on the ground, or the weight of the pad is required for vibration control. Pads shall be 1/2 inch chamfered on all exposed edges and shall be placed and finished smooth and level to insure proper and continuous support for the bearing surfaces of the equipment, with no deviation in excess of 1/8 inch when tested with a 10 foot straight edge.

B. Size: Coordinate length and width of pads and penetrations necessary for piping or conduit with the actual equipment approved for use on the project.

C. Concrete and Steel Requirements: All concrete and steel for housekeeping pads shall comply with the requirements of Division 3, CONCRETE.

D. Housekeeping Pads:

1. Location: Provide concrete housekeeping pads for all floor mounted equipment where indicated and where located in rooms where water piping exists. Unless otherwise indicated housekeeping pads shall be reinforced with a minimum of two layers of 6 by 6 inch, 10/10 welded wire mesh with an 1-1/2 inch cover from the bottom and any exposed surface. Pads less than 18 inches wide shall be reinforced with a minimum of two #4 bars at 6 inches on centers both ways set 1-1/2 inches above the bottom of the pad.
2. Bonding: Housekeeping pads shall be bonded to the floor slab. If the equipment located on the pad must be anchored for support, the anchor bolts shall be anchored to the floor slab prior to the installation of the housekeeping pad.

2.3 ACCESS DOORS AND PANELS

A. Locations: Provide access doors and panels (access units) for access to concealed items which require service or maintenance or other reason for accessibility.

B. Manufacturer:

1. Milcor Division of Inland-Ryerson
2. Bilco
3. Nystrom
4. Ventfabrics

TABLE - ACCESS DOORS AND PANELS

Location	Door/Panel Type
Drywall	Style DW
Masonry or Tile	Style M-Stainless
Acoustical Tile	Style AT
Plaster	Style K
Fire-rated Walls	Style Fire Rated (or as indicated below)

C. Fire Rated Units:

1. Frame and panel assembly shall bear a U.L. label reading, "frame and door assembly, rating 1-1/2 hour (B), temperature rise 30 minutes 250 degrees F. maximum".
2. Shall have an automatic closing device and mechanism to release the latch bolt from the inside.
3. Manufacturer:

    a. Boico
    b. Inryco/Milcor
    c. Nystrom.

D. Non-Fire Rated Units:

1. Steel panels and frames
2. Locks and latches shall be appropriate for the location and shall be cam-lock type latches, flush screw driver operated locks or cylindrical locks.
3. Provide two keys for all doors. All doors shall be keyed the same.

E. Other Requirements:

1. Doors and panels installed in glazed or ceramic tiled surfaces, in toilet rooms or in kitchens shall be stainless steel.
2. Unless otherwise indicated, finish shall be rust inhibitive prime coat.

F. Sizes:

1. Minimum size: 16 inch x 16 inch.
2. Sizes of each unit shall be individually selected to allow the recommended and required service, maintenance and accessibility functions to be accomplished. These functions shall include, for example, valve removal, damper linkage resetting, control adjustment, lubrication, repair, replacement and similar tasks necessary and recommended for the concealed item.
3. No size smaller than 24 inch x 24 inch shall be allowed when a person must pass through the access opening. Access panels for heating equipment shall be minimum 22 inch x 36 inch as required by code.

G. Finish: Coordinate with Architectural Coatings Section.

2.4 IDENTIFICATION OF PIPING AND EQUIPMENT

A. General: Comply with ANSI A13.1, latest edition, "Scheme for Identification of Piping Systems" and OSHA requirements, or as otherwise indicated.

B. Markers: Legends or arrows painted with stencils are not acceptable. Markers must have approved color coded background, proper color of legend in relation to background color and flow arrow indicator. Markers higher than 12 feet above the floor shall have minimum 2 inch letters. Markers shall comply with the following table:

TABLE - IDENTIFICATION MARKER SIZES

O.D. of Pipe or Covering	Length of Color Field	Size of Letters
3/4 to 1-1/4 inch	8 inches	1/2 inch
1-1/2 to 2 inches	8 inches	3/4 inch
2-1/2 to 6 inches	12 inches	1-1/4 inch
above 6 inches	12 inches	2 inches

C. Bands: Color coded in minimum widths of 2-1/4 inch for pipe through 12 inch O.D. and 4 inch for pipe 14 inch O.D. and greater.

D. Valve Tags: Each tag shall designate appropriate service and valve number. Secure attach with meter seals, 4-ply 0.018 copper smooth wire, brass "S" hooks, or brass jack chain to allow easy reading. All valve tags used on a project shall be the same type and manufacturer.

1. Provide either of the following types:

a. Brass Type: Minimum 19 gauge polished brass; 1-1/2 inch min. diameter.
b. Aluminum Color Coded Type: Anodized aluminum; 2 inch min. diameter.
c. Aluminum Alloy Type: 16 Gauge sheet aluminum, depressed type letters filled with black enamel. Face and periphery of satin finish shall be free from burns and scratches.
d. Fiber Glass Type: 1/16 inch thick glass fiber reinforced resin. 2 inch x 2 inch size of 2-1/2 inch x 9 inch size as necessary to identify item.

E. Equipment Labels: Provide either of the following types:

1. Plastic Type: Outdoor grade acrylic plastic to withstand weather, abrasion, grease, acid, chemical and other corrosive conditions; 1/16 inch min. thickness. Sized 3/4 inch x 2-1/2 inch, 1 inch x 2-1/2 inch, 1 inch x 3 inch or 1-1/2 inch x 4 inch as necessary to identify item.
2. Aluminum Type: Engraved, flexible, 0.020 inch thick aluminum. Sized to 3/4 inch x 2-1/2 inch, 1 inch x 3 inch, 1-1/2 inch x 4 inch or 3 inch x 6 inch as necessary to identify item.

2.5 PIPE HANGERS AND SUPPORTING DEVICES

A. General: Pipe hangers and supporting devices shall comply with the requirements of this section unless specifically indicated otherwise in other sections of this division.

B. Material: Pipe supporting devices apply to all piping unless modified in subsequent sections (i.e., vibration isolation) or detailed on the drawings.

1. Pipe hangers for copper pipe shall be copper or copper-plated steel, clevis type. Hangers for all other types of piping shall be galvanized steel clevis type or split ring. Pipe hangers shall be capable of vertical adjustment after erection of the piping. Hanger rods shall be galvanized.
2. Vertical piping riser clamp supports shall be constructed of steel with rounded ears and two or four holes for clamping bolts. Riser clamps shall be galvanized steel, except that riser clamps for copper and brass piping riser clamps shall have electro-plated copper or PVC coating finish.
3. Manufacturer:

    a. Grinnell
    b. PHD Manufacturing Inc.
    c. Pipe Shields Incorporated
    d. Cooper, B-Line

C. Beam Clamp: Beam clamps may be used when supporting piping from steel structures.

D. Inserts: Place concrete inserts in forms prior to the time that concrete is placed.

E. Tamp-ins: Lead tamp-ins may be used when installed in a concrete or masonry wall or other vertical surface to support a vertical hanger. Lead tamp-ins will not be permitted to support hangers from the underside of a concrete slab. (Use drilled-in anchors)

F. Drilled-in Anchors: Steel anchor set in existing or new concrete by drilling and the use of an expansion device is permitted. The anchor shall be provided with a NPT threaded rod connection.

G. Trapeze: For parallel runs of above ground suspended piping, trapeze-type hanger may be used. Provide permanent, non-conductive wrapping between copper pipe and steel trapeze hangers.

H. Prohibited Type: Powder set type fasteners or inserts shall not be used

2.6 FLOOR, WALL OR CEILING PLATES OR ESCUTCHEONS

A. General: Shall be chrome-plated brass. Escutcheons for extended sleeves shall be of the type designed for that purpose. Solid escutcheons shall be used up to 2 inches, split ring escutcheons will be allowed for sizes 2-1/2 inches and above.

B. Location: Provide escutcheons or fabricated plates or collars at each location where pipe or duct passes through a finished surface. Escutcheons for flush sleeves shall be chromium plated brass; for sleeves extending above floor shall be equivalent to Benton & Caldwell chrome plated brass. Collars or plates for ducts and large diameter insulated pipe shall be fabricated of 18 gage galvanized sheet steel, secured to structure and neatly fitted around duct or pipe.

2.7 SLEEVE

A. Pipe Sleeves: Except where indicated otherwise, pipe sleeves shall be as follows:

1. Sleeves installed in walls subject to hydrostatic (water) pressures shall be modular mechanical type consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and sleeve, connected with bolts and pressure plates which cause the rubber sealing elements to expand when tightened to provide a watertight seal.
2. When there is piping existing, and fire rated walls are to be erected, Proset fire rated split wall system pipe sleeves, or an NFPA/UL listed pipe sleeve shall be used.

B. Walls and Partitions:

1. Sleeves (Above Grade): Sleeves shall be mild steel pipe Schedule 40 sleeves built into assembly, sized to pass pipe and covering, leaving a clear space of 1/4 inch minimum between covering and sleeve.
2. Sleeves Installed in Exterior Walls (Below Grade): Schedule 40 steel hot dipped galvanized after fabrication or cast iron. Fabricate the sleeve with 1/4 inch x 3 inch center flange (water stop) around the outside.

C. Floors (Above Grade): Sleeves shall be Schedule 10 galvanized steel. When copper or steel piping penetrates concrete slabs, Proset System for fire-rated and water pipe installations may be used.

D. Duct Sleeves: Sleeves or openings sized for mechanical ducts and covering shall be minimum 24 gauge galvanized sheet steel framed construction in roof, wall, or partitions.

2.8 V-BELT DRIVE

A. General: Each motor driven piece of equipment not direct connected shall be provided with a V-belt drive. Belts shall be of correct cross section to fit properly in sheave grooves and shall be carefully matched for each drive. Sheaves shall be cast iron or steel, bored to fit properly on shafts and secured with keys of proper size. Drive rating shall be as recommended by the manufacturer for service but shall be at least 1.5 times the nameplate rating of motor.

B. Fan Belt Drives: Fixed pitch sheaves shall be provided unless otherwise specified. Sheave-to-sheave centerline distances shall not exceed 3 times the sum of the sheave diameters, and shall not be less than the diameter of the larger sheave.

C. Belt and Coupling Guards: Each belt drive shall be equipped with an OSHA approved guard. Guards shall be constructed of #12 U.S. standard gage 3/4 inch diamond mesh wire screen, or equivalent, welded to one inch steel angle frames, and shall enclose all belts and sheaves. Guard shall be galvanized or painted to match the piece of equipment. Tops and bottoms of guards shall be of substantial sheet metal or not less than #18 U.S. standard gauge. Braces or supports must not "bridge" sound and vibration isolators. Guards shall allow adequate provision for movement of motor required to adjust belt tension. Provide means for oiling, use of tachometers, and other maintenance and testing operations with guard in place.

D. Direct Driven Equipment: Direct-drive motor driven equipment shall have coupling guards in accordance with OSHA Regulations.

2.9 BEARINGS

A. General: Under normal loading conditions per NEMA MG1-14.45, bearings shall be 100,000-hour rated unless otherwise specified. Bearings shall be AFBMA Standard sizes.

B. Bearings shall be greasable-type unless otherwise specified as sealed-type non-greasable.

C. Housing: Bearing housings shall have long, tight running fits or rotating shields to protect against foreign mater entering the bearings and leakage of grease out of the bearing cavity. Housings for greasable bearings shall have a capped grease inlet fitting, grease relief plug on the opposite side of the inlet, and a grease reservoir in the cast inner cap.

D. Extended Lines: Provide extended lubrication lines and fittings to an accessible location for all bearings concealed by equipment housing, belt guards, etc.

E. Factory Lubrication: Provide factory greased bearings. Grease shall be premium moisture resistant containing rust inhibitors and suitable for operation in temperatures from 50 to 250 degrees F.

PART 3 - EXECUTION

3.1 GENERAL

A. Concrete Bases and Structural Steel: Concrete bases and structural steel to support equipment and piping installed under each specification section of this division and not specifically shown on the plans shall be furnished.

3.2 HOUSEKEEPING PADS AND EQUIPMENT SUPPORT

A. Housekeeping Pads: Provide reinforced concrete housekeeping pads where indicated and for all floor mounted equipment located in rooms where water piping exist. Pads shall be 4 inches high unless otherwise indicated. Ground mounted equipment shall have an 8

inch high reinforced concrete housekeeping pad unless otherwise indicated. The pad shall extend a minimum of 6 inches above finish grade.

B. Equipment Bases: Equipment bases shall be 4 inches high unless otherwise indicated or required. Bases for air handling equipment shall be high enough to provide the required trap seal and insulation for the condensate drain.

3.3 EQUIPMENT ACCESS

A. Access Doors and Panels:

1. Locations: Provide access units at the following locations:

   a. Where additionally specified in other sections of this Division 23 and where specifically indicated on the drawings.
   b. Where not specifically indicated on the drawings but where the work to be provided will require accessibility for purposes as described or as recommended by the manufacturer of the concealed item.
   c. At all locations where concealed equipment, fixtures, devices and similar items require accessibility for service, inspection, maintenance, repair, replacement and where such concealed item would not otherwise be accessible for such functions without the provision of an appropriately sized access unit.

2. Coordination of Determination of Locations: Coordinate the work as related to the determination of where access units are to be located.

B. Rejection of Work: Access units which are not in compliance with this Section shall be replaced.

3.4 PAINTING

A. General: Paint all exposed piping, insulation, equipment, structural bases, racks, in equipment rooms and on roof, furnished under Division 23 of these specifications. All exposed metal surfaces shall be given one prime coat and two finish coats of rust inhibiting epoxy paint. All insulated surfaces shall be given one coat of glue sizing (omit this step if factory applied finish is suitable to receive prime coat), one prime coat and one finish coat. Factory painted or finished items do not require field painting but shall require "touch-up" with matching paint or finish where scratched. Follow manufacturers' recommendations on ambient conditions for painting, coat thickness, and drying time between coats.

B. Ancillary Items: Pipe hangers, saddles, supports, riser clamps and accessories shall be painted to match their piping.

C. Inaccessible Items: Equipment not completely accessible for painting when set in place shall be painted to match the existing color scheme for renovation projects and per the following schedule for new projects.

D. Concealed Items: Concealed piping need not be painted.

E. Metal Surfaces: Prepare surfaces in accordance with Architectural Coatings Section.

F. Colors: Colors for piping systems and equipment which are required to be painted shall be as indicated in the following table:

TABLE - PIPING PAINTING SCHEDULE

Class	Paint Color
D - Dangerous Material	Yellow (or Orange)
S - Safe Material	Green (or the achromatic colors White, Black, Gray or Aluminum)
P - Protective Material	Bright Blue
V - Valuable Material	Deep Purple

3.5 IDENTIFICATION OF PIPING AND EQUIPMENT

A. General: Apply after completion of insulation, painting and cleaning work so that final identification is not disfigured.

B. Markers and Bands:

1. Coordinate with composition and operating temperatures of surface for permanent adhesion of markers and labels to surface.
2. Locate marking and banding to facilitate ease of visual tracking. (For example, mark and band parallel runs of pipe which are side-by-side at the same general place.) Labels on vertical piping shall be 7 foot above the floor.
3. Pipes less than 3/4 inch diameter may be identified with tags similar to those specified for valves.
4. Adhere or affix all identification items permanently except where removal may be necessary for maintenance or service. Where labels or arrows are used, overlap the label ends 2 inches with matching color bands completely encircling the pipe.
5. Apply labels on the bottom lower quarters of overhead pipe. Pipe within 24 inches of a wall does not require a label on the quarter facing the wall.
6. Pipe Concealed in Inaccessible Locations (e.g., Chases, non-accessible ceilings): No identification required.
7. Pipe Concealed in Accessible Locations (e.g., Ceiling Plenums): Markers every 30 feet of pipe length. Bands every 15 feet of pipe length.
8. Pipe Exposed in Equipment Rooms: Markers and bands every 15 feet of pipe length for pipe through 12 inch O.D. and every 30 feet for pipe 14 inch O.D. and greater.
9. Exterior Pipe, Exposed: No identification required unless otherwise indicated.
10. Exterior Pipe, Underground: Place a color-coded 6 inch wide, 0.004 inch thick polyethylene printed identification tape directly above all underground piping systems. The tapes shall be located approximately 12 inches below finish grade. Each tape shall be continuously printed with the words "CAUTION" in large bold lettering, and with the type of service piping also indicated.

C. Valve Tags: Valve tags shall be installed on the following items:

1. All control valves (except those valves associated with direct control of flow to air handling apparatus whereby the valve may be identified by reference to the item of equipment it serves).
2. All fire protection system valves located in mains and branches (except those valves in fire hose cabinets).
3. Valves installed under Division 23 of the specifications except check valves, drain valves, gauge valves, and manual air vent valves.
4. Small piping (other than domestic water) where markers are impractical.
5. Small but critical equipment items on which it is impractical to install labels.

D. Valve Tag List: Prior to requesting Substantial Completion, provide a complete list of all valves having tags. Frame under glass and mount in the mechanical equipment room at a location acceptable to the Designer. Indicate the following:

1. Valve size
2. Valve location
3. Valve type
4. Service application
5. Valve manufacturer and model number
6. Pressure class and allowable working pressure
7. Safety warnings
8. Sequencing information
9. Seasonal operating position (normally open/normally closed)

E. Labels: Provide labels of proper size on mechanical system equipment including but not limited to, pumps, chillers, tanks, major piping components such as air separators, air handling equipment, fans, control panels, terminal units, flow stations, reheat coils and similar items. Provide labels on access panels indicating the item accessible through the panel. Equipment labels shall be mechanically fastened with machine screws or rivets; adhesive securing is not acceptable.

F. Identification: Coordinate colors and finishes with pipe identification markers.

3.6 HANGERS AND INSERTS

A. General: Refer also to other sections which may describe additional requirements for hanging and supporting.

B. Location: Locate hangers to support piping and equipment. Arrange hangers to permit expansion and contraction. Do not hang piping from fire or smoke walls. Provide pipe hangers at each valve, strainer, and other piping accessory, and at each change of direction.

C. Size: The size of hanger for non-insulated pipes shall be suitable for pipe size to be supported. For insulated piping, the size of the hanger shall be suitable for the pipe size, plus the insulation and an insulation shield. Refer to Section 23 07 00, THERMAL INSULATION, for insulation shield requirements.

D. Protection: Isolation of copper pipe from steel trapeze hangers shall consist of wrapping pipe and 1 inch each side of contact surface with not less than two layers of adhesive type plastic dielectric insulating tape.

E. Spacing: Locate pipe supports as indicated in the following table unless noted otherwise in other sections of the specifications or on the drawings:

TABLE - HORIZONTAL PIPE HANGER SCHEDULE

Material	Pipe Size	Hanger Spacing
Steel Pipe	Under 1 inch	6 foot centers
	1 to 2 inches	8 foot centers
	2-1/2 to 4 inches	10 foot centers
	5 inches and larger	12 foot centers
Copper Tubing	up to 1-1/4	6 foot centers
	1-1/2 and above	10 foot centers
Cast Iron Pipe	All	5 foot centers

1. Vertical Pipe: Vertical piping shall be supported at the base of each vertical riser, and at intervals not exceeding those indicated in the following table:

TABLE - VERTICAL PIPE SUPPORT SCHEDULE

Material	Pipe Size	Support Spacing
Steel Pipe	All	Every other story (30 foot centers max)
Copper Tubing	up to 1-1/4	4 foot centers
	1-1/2 and above	Every story
Cast Iron Pipe	All	Every story (15 foot centers maximum)

F. Hanger Rods: The size of the hanger rods shall be according to the following table. The rod sizes are based on the maximum hanger spacing indicated in the table above.

Pipe Size Inches	Minimum Hanger Rod Size, Inches	
	Cast Iron	Copper or Steel
Up to 6	3/8	3/8
8	1/2	1/2
10	1/2	5/8

* Indicates mechanical joint, ductile iron pipe.

G. Pipe Guides: Provide pipe alignment guides to guide expanding pipe to move freely from anchor points in expansion joints, loops or bends.

3.7 ANCHORS

A. General: Install a suitable anchor on piping to prevent movement from expansion and contraction by welding or clamping securely to pipe at fitting or coupling. Approval of the Designer/OAR of method of anchorage must be obtained before installation of work.

Properly anchor piping to remove strains on equipment which would be caused by expansion and contraction. Insulate anchors on piping to prevent moisture condensation problems.

B. Below Grade: Where mechanical joint piping enters the building below grade, the last section of pipe shall have anchor bolts tied to the building structure.

3.8 SLEEVES

A. General: Lay out work and set sleeves in new or existing construction for a minimum of cutting, drilling and patching. Sleeves not used during construction shall be sealed using grout. Unused penetrations or sleeves through fire and smoke rated partitions shall be sealed to prevent passage of fire and smoke using an Underwriters Laboratories approved method rated at least equal to the partition being penetrated; method utilized must show proof of UL approval.

B. Placement: Extend sleeves through walls, partitions and ceilings to finished surface. Extend sleeves 1/4 inch above finished concrete floors and 1 inch above slab in chases. Sleeves, installed above finished ceilings, for fire/smoke rated wall assemblies shall extend 1 inch beyond each face of wall. Sleeves shall be set before floor is poured, sized to pass pipe and covering, leaving a clear space of 1/4 inch between covering and sleeve.

C. Size: Size sleeves to permit clearance for pipe movement and proper grading of pipes. Sleeves for insulated pipe shall be sized to clear insulation.

D. Sealing of Sleeves:

1. Sleeves Below Grade: Make wall penetration water tight with mechanical link-seal.
2. Sleeves Above Grade Through Non-rated Surface: Openings around pipes, duct, etc., passing through sleeves shall be draft free and vermin-proof and sealed with suitable caulking.
3. Sealing of Sleeves Through Fire or Smoke Rated Partition: All penetrations through fire rated partition shall comply with the requirements of paragraph entitled "FIRE/SMOKE RATED FLOOR, PARTITION OR WALL PENETRATION SEALANT" in this section.

E. Fire/Smoke Penetrations: Caulk space between insulation or pipe and sleeve and seal with fire rated material (or flexible fire retardant sealant if pipe is subject to expansion or contraction) to serve as a fire and smoke stop.

F. Water Tight: Sleeves in walls and/or slabs subject to hydrostatic pressures shall be water tight.

3.9 ESCUTCHEONS

A. General: Provide escutcheons (for 1/4 or 1 inch projecting sleeves as required) at each point where pipe passes through a finished surface.

3.8 V-BELT DRIVE

A. Sheaves: To provide the properly sized sheave, V-belt drive fans shall be initially provided with variable pitch sheaves. Upon completion of system balancing by the T&B Agency, the adjustable pitch sheaves shall be replaced with fixed sheaves and belts of the size and type specified by the T&B Agency. Tag the adjustable sheaves and receive written receipt from the Owner accepting these sheaves.

3.9 EXCAVATION AND BACKFILL

A. General: Comply with the requirements of Division 2. Perform in accordance with applicable State and Local codes and with other applicable sections or divisions. See identification tape requirement indicated above.

B. Excavation: Excavate to a minimum necessary depth. Provide an even undisturbed surface to ensure a solid, continuous bearing surface. If cut is too deep, backfill with clean earth and hand tamp. Form depressions at joints to receive collars and couplings.

C. Backfill: Comply with requirements of Division 2.

3.10 SEALANT

A. General: Fire/smoke sealant shall be installed in strict compliance with the manufacturer's installation instructions.

END OF SECTION 230503

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SECTION 230700 – THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Basic Requirements: Provisions of Section 23 05 01, BASIC MECHANICAL REQUIREMENTS are a part of this Section.

1.2 SUMMARY

A. General: Provide thermal insulation as indicated. Materials such as fasteners and retainers not specifically described but required for a complete and proper installation shall be provided.

1.3 SUBMITTALS

A. General: Include the following data:

1. Manufacturers Literature:

   a. Provide data on all types of insulation, jacketing, sealer and adhesive required by this section of these specifications, with indication of each material and its intended application.

2. Performance Data:

   a. Provide thermal performance, density and vapor permeance for each type of insulation, finish, cover, facing or jacket specified in this section.
   b. Unless otherwise stated, insulation types and thicknesses specified are based on insulating materials having a "K" value (BTU per hour per square foot per degree temperature difference) per inch of thickness as indicated.
   c. Vapor permeance is based on vapor retardant materials having water vapor transmission rates in perms (grains of vapor per hour per square foot per inch of mercury vapor pressure differential).
   d. Alternate materials shall be approved on the basis of thicknesses providing equivalent heat transfer or vapor transmission rates.

3. Installation Instructions: Provide copy of manufacturer's printed installation instructions for all insulation materials including copies shipped with the material.

1.4 APPLICABLE STANDARDS

A. General: All equipment, material, accessories, methods of construction and reinforcement, finish quality, workmanship and installation shall comply with the paragraph entitled "Code Compliance" in Section 23 05 01.

B. NFPA: All materials and adhesives used shall conform to the requirements of NFPA 90A as to flame spread and smoke developed ratings throughout their operating temperature range. All insulation, jackets, covers, facings and adhesives used to adhere the jacket or facing to the insulation, including fittings and butt strips, shall have a non-combustible fire and smoke hazard rating and label as tested by ASTM E-84, NFPA 255 and UL-723 not exceeding flame spread value of 25 and smoke developed/fuel contributed value of 50. Accessories such as mastics, cements, tapes and cloth for fittings shall have the same ratings.

C. ASHRAE: Insulation thermal conductance values and insulation thicknesses shall comply with the requirements of the American Society of Heating, Refrigeration, and Air Conditioning Engineers, Inc. (ASHRAE) Standard 90.1.

D. Industry standards: Where compliance with an industry, society or association standard is specified or indicated, certification of such compliance shall be included in the submittal.

E. Packaging Information: All products or their shipping cartons shall bear the Underwriter's Label indicating that flame and smoke ratings do not exceed the above criteria. Every package or container of insulation, jacketing, facing, cement, adhesive, or coating delivered to the project site must have a manufacturer's stamp or label attached, giving the brand and a description of the material. All vapor retardants shall be labeled, indicating the thickness, product nomenclature and manufacturer.

1.5 DEFINITIONS

A. General: The following definitions apply to this section of these specifications:

1. Concealed: The exterior surface of the insulation is concealed from view when standing inside a finished room, such as piping or duct insulation inside a chase or above a ceiling.
2. Exposed: The exterior surface of the insulation is seen from inside a finished room, such as piping or duct insulation inside an equipment or air handling unit room.
3. Protected: With reference to insulation material on the exterior of the building but protected from direct exposure to rain by an overhang or eave. Piping or duct insulation located in an unconditioned parking garage or building crawl space.
4. Unprotected: With reference to insulation material on the exterior of the building and exposed to rain.

PART 2 - PRODUCTS

2.1 GENERAL

A. Materials: The insulation materials and installation procedures shall be as indicated in this section and must be approved by the insulation product manufacturer for each particular application. The actual products to be used must comply with the insulation material for the specific application as indicated in other sections of these specifications.

B. Applicability: Products and manufacturers listed may not all be applicable. Use only those products and manufacturers which are indicated as being applicable to a specific insulation condition. Insulating materials shall be resilient and moisture-resistant so that the insulating properties will not be affected by rough handling, water damage and similar construction hazards. All adhesives, sealers and vapor retardant coatings shall be compatible with the materials to which they are applied, and shall not corrode, soften or attack such materials when wet or dry.

C. Acceptable Manufacturers: Manufacturers which are listed are those manufacturers who may make one or more of the insulation products required. Listing of a manufacturer does not mean the manufacturer is approved for all applicable insulation conditions. Manufacturers must comply with the requirements of each insulation condition to be acceptable for the application.

2.2 ELASTOMERIC CELLULAR FOAM

A. General: Flexible foam-type expanded closed-cell preformed (tube), roll or sheet as applicable. Nitrile, rubber based, closed cell structure. Maximum K value of 0.27 at 75 degrees F., and maximum water vapor transmission of 0.02 perm. Allowable temperature applications from -40 degrees F. to 220 degrees F. when installed in accordance with manufacturer's recommendations. Do not install in return air plenums.

1. Pipe Insulation: Preformed elastomeric.
2. Sheet Elastomeric Insulation: Field formed, fitted and finished as required for the application.

    a. Manufacturer:

        1) Armstrong AP Armaflex
        2) Rubatex
        3) Approved Substitution

B. Adhesive: For joints and seams in foam insulation.

1. Manufacturer and Product:

    a. Rubatex R-373 Insulation Adhesive
    b. Armstrong 520 Adhesive
    c. Approved Substitution

C. Finishing Coating: For weather protection of foam insulations.

1. Manufacturer and Product:

    a. Rubatex 374 coating
    b. Armstrong Armaflex Finish
    c. Approved Substitution

2.3 FIBERGLASS INSULATION

A. General: Inorganic fibrous glass.

B. Board: Faced rigid or semi-rigid form. Stiffness of 800 EI unless otherwise indicated.

1. Duct insulation external: Fiberglass semi-rigid board. Composed of resin bonded glass fibers faced with a foil scrim-kraft (FSK) reinforced laminate of aluminum foil and kraft bonded to provide a metallic surface finish vapor retardant; alternate vapor retardant facing (if specifically indicated) is an all service jacket (ASJ) of high intensity white bleached, chemically treated kraft paper reinforced with fiberglass yarn mesh and laminated to aluminum foil with fire-retardant adhesive to impart a clean, white appearance. Conductivity (K) of not less than 0.23 at 75 degrees F. Provide in thickness of 1-1/2 inches unless otherwise indicated. Provide with minimum density of 3-pcf unless 6-pcf is specifically indicated.

a. Manufacturer:

1) CertainTeed
2) Schuller
3) Owens-Corning
4) Knauf

2. Equipment insulation: Rigid, minimum 6-pcf density fiberglass with factory-applied laminated foil vapor retardant Kraft- reinforced with a glass fiber scrim. The board shall be minimum 1-1/2 inch thick with a K-value of 0.22 at 75 degrees F. mean temperature, maximum vapor transmission of 0.02 perm and be able to operate from -20 to 450 degrees F. If insulation having a higher K-value is used, the thickness shall be increased proportionally to achieve the specified K rating. Boards shall have a minimum dimension of 10 inch and a maximum dimension of 48 inch.

a. Manufacturer:

1) Schuller
2) Owens-Corning
3) Approved Substitution

C. Blanket: Flexible form; faced, unfaced or coated as indicated.

1. Duct insulation, external: Composed of flexible blanket of glass fiber factory laminated to a reinforced foil kraft (FRK) vapor retardant with a minimum 2 inch taping and stapling flange on one edge. Suitable for operation at temperatures from 40 degrees F. to 250 degrees F. thermal conductivity of 0.31 at 75 degrees F. Minimum density of 1-1/2 pcf. Provide in thickness of 2 inches unless otherwise indicated.

2. Finish Fabric, General Purpose: Nylon membrane. For use generally with fiberglass duct insulations at joints or seams or as indicated. Apply using Foster GPM 35-00 or equivalent.

a. Manufacturer:

1) Armstrong
2) CertainTeed
3) Childers Products Co.
4) Knauf
5) Schuller
6) Owens-Corning
7) Pittsburgh Corning

D. Preformed: Jacketed or unjacketed as indicated, one-piece or half-sectional.

1. Pipe insulation, preformed jacketed fiberglass: Jacketed with factory-applied kraft reinforced foil all-service vapor retardant jacket suitable for use in systems with temperatures from -60 to 350 degrees F. The jacketing shall have a white finish suitable for painting without sizing. Jacket closure system of factory-applied double pressure-sensitive adhesive on longitudinal joints; self-sealing butt strips at circumferential joints which provide closure and positive vapor retardant seal without hard rubbing or the application of heat. Thermal conductivity (K) of 0.24 at 100 degrees F. and vapor transmission of 0.02 perms.

a. Manufacturer:

1) Owens-Corning
2) Schuller
3) CertainTeed

2. Pipe insulation, preformed unjacketed fiberglass: Suitable for field-jacketing. Thermal conductivity (K) of 0.23 at 100 degrees F.

a. Manufacturer:

1) Owens-Corning
2) Schuller
3) Approved Substitution

2.4 INSULATION MASTICS AND ADHESIVE

A. Mastic: Low-odor, fire and vapor retardant mastic with permeance not exceeding 0.08 perms in accordance with ASTM E96. For use where indicated or otherwise applicable. Coating shall be non-flammable in both dry and wet states.

1. Manufacturer:

a. Foster
b. Childers
c. Approved Substitution

2. Adhesive: For adhering fiberglass blanket and board insulations to metal substrate such as ductwork.

a. Manufacturer:

1) Insul-Coustic
2) Foster
3) Approved Substitution

2.5 INSULATION JACKETS AND COVERS

A. Jacket, Pipe, Aluminum: Aluminum jacketing, 0.016 inches thick, Type 3003 alloy, H-14 temper, circumferentially corrugated, with a continuously laminated moisture retardant of one mil polyethylene film and a protective layer of 40 lb. virgin kraft paper. Longitudinal jacket seams shall be provided with modified continuous Pittsburgh Z-lock located on the bottom half of the pipe to shed water.

1. Manufacturer:

a. Childers Products Co
b. General Aluminum Supply Co
c. Insul-Coustic

B. Pipe Fitting Covers, Aluminum: Aluminum fitting covers, 0.020 inches minimum thickness, type 3003 alloy, H-14 temper prefabricated fitting covers with baked epoxy moisture retardant for pipe sizes through 24". Field fabricate fitting covers for pipe sizes larger than 24 inch using 0.020 inches thick aluminum roll jacketing with laminated polyethylene/kraft moisture retardant.

1. Manufacturer:

a. Childers Products
b. Approved Substitution

C. Pipe Fitting Covers, Reusable: Removable/Reusable covers for valves and strainers manufactured with a jacket of chemically-resistant silicon-coated fiberglass 6 pcf mechanically-bound ceramic fiber insulation for hot piping and fiberglass belting with "D"-ring belts. Use 3" foamglass for chilled water.

1. Manufacturer:

a. Superior
b. Approved Substitution

2.6 RELATED PRODUCTS

A. Wire: Dead soft, 16-gauge, stainless steel.

B. Straps: Stainless steel T-304 (18-8) soft annealed with deburred edge with stainless steel wing seals.

1. Manufacturer:

a. Childers Products

b. Approved Substitution

C. Tape: High tensile strength rope stock flat back paper pressure sensitive tape.

1. Manufacturer:

a. Pittsburgh-Corning
b. Approved Substitution

D. Screws: Aluminum pan head type "A" slotted #8 by 1/2 inch.

PART 3 - EXECUTION

3.1 GENERAL

A. Field Forming, Fitting and Finishing: Where preformed insulation products are available they shall be used. Provide field formed, fitted and finished insulation systems only if such application is more practical and acceptable to the Designer/OAR.

B. Pre-installation:

1. Prior to work of this section, carefully inspect the installed work of all trades and verify that all work is complete to the point where this installation may properly commence.
2. Insulation on pipe fittings, valves and pipe joints shall not be installed before the piping is tested and approved. Do not apply insulation adhesives, materials or finishes until the building is adequately closed in and the item to be insulated has been completely installed, tested and proved tight and suitable for insulation.
3. Remove all foreign material, clean and surfaces before applying insulation.

C. Penetrations: All insulation shall be continuous through walls, floors and ceiling openings, except at fire dampers. Pipe insulation through fire rated partitions shall be cellular foamglass type only, with the ends sealed; fiberglass and foam insulation through rated partitions is prohibited. Where piping and ducts pass through partitions (walls or floors), the openings in the construction around the piping and ducts shall be packed with fire-stop material to provide an effective retardant against the spread of fire, smoke and gases as shown in the detail drawings or as shown in a current Underwriter's Laboratory "Building Materials Directory". Submit a copy of the intended system to the authority having jurisdiction for their review and acceptance.

D. Vapor Retardant Continuity: A continuous, unbroken moisture and vapor seal shall be provided over insulation on cold surfaces where vapor retardant jackets, facings, or coatings are required. Anchors, hangers and other projections shall be insulated and vapor-sealed to prevent condensation. All openings and punctures shall be sealed with a vapor retardant compound. The edges of vapor retardant insulation at valve stems, instrument wells, gauge connections, unions and other raw edges shall be sealed to prevent moisture from penetrating the insulation by sealing on all open ends.

E. Workmanship: Insulation materials shall be installed in a workmanlike manner with smooth and even surfaces, with jackets drawn tight and smoothly cemented down at all longitudinal and end laps. Jacket and facing laps, joint strips and insulation ends, and straight runs of piping at not more than 21 foot intervals shall be secured and sealed with fire-retardant vapor retardant adhesive. Scrap pieces of insulation shall not be used where a full-length section will fit. All surface finishes shall be extended to protect all interfacing surfaces, ends and raw edges of insulation. Insulation on strainers shall be installed to facilitate cleaning of the strainer.

F. Hot Equipment Hanger Insulation: On all hot piping and equipment, hangers and supports may be attached to piping or equipment before insulation is applied, except where roller hangers are required.

G. Cold Equipment Insulation:

1. Hangers and Supports: Insulation and jackets shall be neatly finished at pipe and duct hangers, clamps, anchors, and other supports which are in contact with the pipe or duct. Insulation shall consist of rigid pipe or duct insulation of equal thickness to the adjoining insulation, and shall be provided with a vapor retardant seal. The length of insulation shall be sufficient to prevent condensation but not be less than 9 inches.
2. Pipe Shields: For cold piping, hangers and supports shall be installed on the outside of the insulation and the insulation shall be protected by a galvanized metal shield. Shield shall extend halfway up both sides of the pipe insulation cover and shall provide support over the bottom 120 degree arc of the insulation. If the hanger is too large to provide this support a metal liner shall be provided. The shield shall be fastened with pipe straps at each end. The insulation shields shall comply with the following table:

TABLE - PIPE INSULATION SHIELDS

Pipe Size, Inches	Metal Gauge	Length, Inches
1/2 to 1-1/2	18	12
2 to 4	16	12
6	16	18
Note: This table is based on an insulation with a minimum of 4 psi compressive strength and a maximum of a 10 foot span between hangers. Any modifications must be submitted for acceptance.		

3. Trapeze Hangers: Insulated piping supported on trapeze hangers shall have a 6 inch long paraffin coated hard maple curved block between the saddle and the piping. The block shall be encased in the insulation exterior jacket or vapor barrier.

H. Valves, Cocks and Specialties: Insulate as for the related piping system in which they are located unless otherwise indicated.

I. Piping: Insulation thicknesses for piping are given for insulation installed at the locations indicated. Thicknesses are based on the various conditions of temperature, usage and environment which are typically encountered.

J. Insulation Over Nameplates: Cleanouts, nameplates, ASME labels and manholes shall not be insulated, and the insulation on surrounding surfaces shall be neatly beveled off at such openings.

K. Factory Pre-insulated Components: Where equipment and other system components are specified in other sections to have factory installed insulation, no additional insulation is required unless additional non-factory-installed insulation is specifically described.

L. Minimum Thicknesses: Insulation thicknesses which are indicated are minimum thicknesses. The same insulation material may be provided in greater thickness as an aid to installation and handling procedures or due to material availability and procurement considerations, as long as the additional thickness does not reduce critical clearances from other piping, walls, etc. and does not increase the thermal conductance.

M. Bands and Fasteners: Metal bands used on pipe insulation shall be 3/4" wide made from brass or aluminum. Bands shall be spaced to hold the ends and center of each section at a maximum spacing of 18 inches on centers. Bands shall not be visible on exposed work. Mechanical fasteners shall be installed in accordance with the manufacturers recommendations. Projecting points and sharp edges of fasteners shall not extend outside the insulation facing; clip off projecting points and provide plastic caps or cement cover finish.

3.2 ELASTOMERIC CELLULAR FOAM

A. Interior: Slip pipe insulation onto the piping before it is connected and seal the joints with adhesive. Where insulation cannot be slipped on, the insulation shall be slit lengthwise, applied to the piping, and sealed on all longitudinal seams and mitered butt joints. Insulation for fittings shall have sleeve-type covers made from miter-cut pieces of insulation of the same type as the adjacent piping. The inside of the fitting insulation must overlap the insulation on the adjoining piping.

B. Exterior: Provide insulation as detailed for interior use, except finish with weather-proofing coatings in accordance with the manufacturer’s instructions.

C. Underground: Not acceptable.

3.3 GLASS FIBER PIPING INSULATION

A. Interior, Concealed: Insulate with glass fiber insulation with all purpose jacket. Elbows, joints, valves, and all like items shall be insulated using closely mitered insulation and wrapped with glass fabric secured with 20-gauge non-corrosive wire finished with a smoothing coat of insulating cement and mastic or insulated and jacketed using factory-made pre-molded pipe fitting covers. Install all items in strict accordance with the manufacturer's recommendations.

B. Interior, Exposed: Provide as specified for "Interior, Concealed", except where field-fabricated fitting covers are used. Additionally, finish with open weave 20x10 mesh glass fabric adhered between two flood coats of white lagging adhesive, overlapping the adjacent pipe insulation 2" and smoothed to a neat uniform finish without noticeable ridges

or exposed fabric. Finish materials shall be applied in strict accordance with the manufacturer's recommendations.

C. Interior, Exposed, Special Locations: Provide same as "Interior, Exposed" with the additional requirement that the final coat of mastic for the insulation finish shall be gloved and finished to accept painting.

D. Exterior, Protected: Provide the same insulation system as "Interior, Concealed" except thicknesses as specified. Cover finish with aluminum jacketing and fitting covers. Secure fitting covers with screws and secure jacketing with straps containing a high-temperature sealant.

E. Exterior, Unprotected: Provide the same as for "Exterior, Protected".

F. Underground: Not acceptable.

3.4 DUCT SYSTEMS

A. General: Air handling unit casings downstream of cooling coils shall be insulated. Insulate supply and return air ducts for heating and air conditioning systems from supply fan discharge to room outlets on all systems, and outside air ducts.

B. Interior, Concealed, External Insulation: Insulate with a minimum of 2 inch thick fiberglass blanket wrap applied over clean, dry sheet metal ductwork installed to allow maximum fullness at corners (avoid excessive compression). Adhere duct insulation to metal with 4 inch strips of insulation bonding adhesives on 8" centers or with adhesive applied in accordance with the manufacturer's recommendations. Where duct width exceeds 24 inches, the insulation shall be additionally secured to the bottom of the duct using mechanical fasteners spaced 1 foot on center to prevent sagging of the insulation. Insulation shall be applied with edges tightly butted, vapor retardant facing overlapped a minimum of 2 inch, and all joints and breaks in the vapor retardant sealed using glass fabric and mastic applied in conformance with manufacturer's recommendations.

C. Interior, Exposed, Round: Insulate with same insulation system as for "Interior, Concealed". An acceptable alternate is preformed jacketed fiberglass pipe insulation of the same internal size as the round ductwork, with performance criteria and installation as specified herein.

D. Interior, Exposed, Rectangular: Insulate with semi-rigid fiberglass board. Adhere to ductwork with adhesive. Finish joints and seams with finish fabric and mastic to provide a smooth, seamless and vapor-retardant finish.

3.5 DUCT SYSTEMS EQUIPMENT

A. General: Insulate as follows unless detailed to a greater extent elsewhere.

B. Fire damper and Fire/Smoke Damper External Surfaces:

1. Externally Insulated Duct Locations: Extend duct insulation and vapor barrier up face of fire damper to damper sleeve retaining angles. Seal insulation edges with 4 inch minimum width duct tape.
2. Internally Insulated Duct Locations: Provide additional external insulation from a point on the duct 12 inches from the fire damper to the fire damper and on the face of the fire damper to the fire damper sleeve. Seal insulation edges with 4 inch minimum width duct tape.

C. Duct Accessories: Where ducts will be insulated, make provisions for neat insulation finish around damper operating quadrants, splitter adjusting clamps, access doors, and similar operating devices. A metal collar equivalent in depth to insulation thickness and of suitable size to which insulation may be attached and finished shall be mounted on the duct.

3.6 COLD EQUIPMENT AND RELATED COMPONENTS

A. Condensate Drain Piping from Cooling Equipment:

1. Interior; and Exterior, Protected: Insulate with preformed elastomeric pipe insulation secured with adhesive and finished with a white finish coating.
2. Exterior, Unprotected: None required.

B. Flexible Pipe Connectors for Vibration Isolation: Insulate with elastomeric insulation. Secure the insulation with adhesive applied to a clean surface and finish with white finish coating.

3.7 REMOVABLE INSULATION

A. Equipment Insulation Covering: The covering on parts of equipment which must be opened for inspection, cleaning and repair shall be constructed to be removed and replaced without damage. Covers shall be installed as complete units or in sections and shall have metal fastenings and all necessary support frames and members. Equipment to be covered shall be in insulated boxes of thicknesses specified; the boxes shall be held and drawn together by bolts. Insulation shall be protected by means of metal bands around each section formed to provide a vapor-sealed telescopic fit at the joints between the sections. Cut, score or miter insulation to fit the contour of the equipment and secure with 1/2 inch x 0.015 inch galvanized steel bands or 15-gauge galvanized wire on 12 inch centers. Weld pins or stick clips with washers may be used for flat surfaces when spaced 18 inch apart. Joints shall be staggered where possible, and voids shall be filled with insulating cement. One of the following finishes shall be provided:

1. Apply 1 inch galvanized wire mesh over the entire surface and finish with two coats of insulating cement troweled to a hard, smooth finish, with a minimum coat thickness of 1/8 inch per coat;
2. Apply a smoothing coat of insulating cement. When dry, apply a coating of lagging adhesive, and imbed a layer of open weave 20x10 glass cloth, overlapping all seams of 2 inch and finish with a second coat of same adhesive, with a minimum coating thickness of 1/4 inch;

3. Insulation with factory-applied Universal Glass Cloth vapor retardant needs no additional finish. Joints in factory-applied facing shall be covered with 4 inch wide strips of the same material and cemented in place.

3.8 MISCELLANEOUS ITEMS

A. General: Provide insulation of any portion of a system or piece of equipment not previously discussed where ambient operating conditions will allow condensation to occur or whose surface temperature exceeds 115 degrees F. Insulation materials and method shall be as directed by the Designer.

B. Final Inspection: At final inspection the finished surfaces of all exposed insulation shall be clean and without stains or blemishes. Repair and clean the insulation surfaces and, if necessary to obtain a new appearance, shall coat discolored surfaces with off-white latex water-base semi-gloss paint or lagging adhesive, without a change in the contract price.

END OF SECTION 230700

SECTION 230800 - PERFORMANCE VERIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Basic Requirements: Provisions of Section 23 05 01, BASIC MECHANICAL REQUIREMENTS, are a part of this Section.

1.2 SUMMARY

A. General: The Contractor will select and pay for the services of a test and balance agency (herein referred to as the T&B Agency) for system and equipment performance verification.

B. Scope: Verifying the performance of the complete heating, ventilation and air conditioning systems of Division 23, by testing and balancing procedures described in this section.

1.3 APPLICABLE STANDARDS

A. All equipment, material, accessories, methods of construction and reinforcement, finish quality, workmanship and installation shall comply with Section 23 05 01.

1.4 TEST AND BALANCE AGENCY

A. General: Performance verification shall be performed by an independent T&B Agency.

B. Certification: The T&B Agency shall be a certified member of the Associated Air Balance Council (AABC) or the National Environmental Balancing Bureau (NEBB).

C. References: The T&B Agency shall have been in business continuously for the previous three (3) years and shall specialize in and be limited to testing and balancing HVAC systems. The T&B Agency shall submit references of five previously successfully completed projects of similar size, type, scope, and complexity.

D. Supervision: Field work shall be performed under the direct supervision of a full-time employee of the T&B Agency. The final test reports shall be certified and sealed by the supervisor and signed by the employees performing the work.

E. Approval: The T&B Agency shall not be affiliated with the construction contractors, equipment manufacturers, sales vendors, or design engineering firms. Schedule all test and balancing work in cooperation with the T&B Agency and at the direction of the Owner. The T&B Agency shall report to the Designer in writing anytime the scheduled services cannot be performed as schedule or as required. All equipment shall be operational during the test and balance process.

F. Reporting: The T&B Agency shall function as an authorized inspection agency responsible to the Owner, and shall list all items which are installed incorrectly, require correction or completion, or which have not been installed in accordance with the contract documents. Prior to beginning system balancing, submit to the Designer for the Owner's review, written procedures to be followed for the testing and balancing work.

1.5 INSTRUMENTATION

A. General: All test and balance equipment and instruments shall be furnished by the T&B Agency and shall have been calibrated to the tolerances required in balancing standards within six (6) months of use on this work. A list of equipment and instruments shall be submitted to the Designer for the Owner's review prior to commencing test and balancing operations and shall include manufacturer, serial number and certification of last calibration date and method of calibration including test references. Instruments without calibration adjustment capability shall be accompanied with manufacturer's certification of accuracy. Instruments shall have maximum field measuring accuracy, shall be applied as recommended by the manufacturer, and shall have minimum scale and maximum subdivisions with ranges for the values being measured.

1.6 WORK INCLUDED

A. General: The T&B Agency shall provide all labor, supervision, professional services, tools, test equipment and instruments (except as otherwise indicated) to perform work of this section; including but not limited to:

1. Review the temperature control and equipment specifications for their effects on the testing and balancing procedures for the air systems.
2. Where conditions may exist in the system design or construction which may adversely affect system performance, identify the conditions and submit recommended corrections in writing for consideration by the Designer.
3. During construction, review shop drawings relevant to performance verification to confirm that the required piping, ductwork and equipment, and their respective specialties and accessories such as gauges, valves, dampers, access doors, etc., are properly selected, sized and located to permit proper and complete testing and balancing.
4. Perform a complete air test and balance of all heating, ventilating, air conditioning and exhaust air systems described on the Contract Documents.
5. Submit the Equipment Test and Systems Balance Report for review and acceptance.
6. Furnish specifications for properly-sized fixed sheaves and belts on fan systems after proper RPM has been established.
7. Test for sound and vibration levels.
8. Test and report pressure differentials between the sampling and return ports of all duct smoke detectors.

1.7 GUARANTY

A. General: The T&B Agency shall include a warranty period of ninety (90) days after acceptance of test and balance work. During the warranty period, the Owner may request a re-check or re-setting of any system component requiring testing and balancing. The T&B Agency shall provide technicians, instruments, and tools to assist the Owner in conducting any test required. A guarantee, such as the AABC National Project Certification Performance Guarantee, shall also be provided.

PART 2 - PRODUCTS

2.1 REPORT

A. Records: Recorded test data shall be at the final balanced condition for each system, and shall be arranged by system using the appropriate designation as established on the Contract Documents. Six (6) copies of the typewritten, signed, bound and indexed final report shall be submitted to the Owner review prior to request for substantial completion inspection. The substantial completion inspection shall not be scheduled until the final report has been received and is acceptable to the Owner. Report format shall be similar to forms approved for use by SMACNA or AABC.

B. Measurements: Where actual measurements recorded for the final balance show deviations of more than five (5) percent from the design, the T&B Agency shall note same in the report and submit recommendations for corrective action to the Owner.

C. Deficiency: Where recorded data can be reasonably interpreted to be inaccurate, inconsistent or erroneous, the Owner may request additional testing and balancing. The T&B Agency shall perform retesting and re-balancing at no additional cost.

D. Vibration: Where, in the opinion of the T&B Agency, there is excessive vibration, movement or noise from any piece of equipment, ductwork, pipes, etc., the T&B Agency shall note same in the report and submit recommendations for corrective action to the Owner.

E. Controls: The T&B Agency shall verify that each controller and the devices it controls, such as control valves, motorized dampers, etc., operates in the exact sequence required.

F. Test Data: Include the following data in the Systems Test and Balance Report:

1. Motors:

a. Manufacturer
b. Model and serial number
c. Rated amperage and voltage
d. Rated horsepower
e. Rated RPM
f. Measured amperage and voltage
g. Calculated brake-horsepower
h. Measured RPM

i. Sheave size, type and manufacturer
j. Bearing model numbers

2. Fans:

a. Manufacturer
b. Model or Serial number, type of fan, number of blades, wheel diameter
c. Rated CFM, measured CFM
d. Rated RPM, measured RPM
e. Design inlet and outlet total and external static pressures
f. Actual inlet and outlet total and external static pressures
g. Pulley sizes, types and manufacturers
h. Belt size and quantity (V-belt drive only)
i. Bearing model numbers

3. Air Systems (including inlets and outlets):

a. Grille or diffuser reference number, manufacturer and type
b. Grille or diffuser location
c. Design and measured velocity
d. Design and measured CFM
e. Effective area factor and size, and diffuser flow coefficients
f. Terminal Unit CFM
g. Tabulation of design and measured CFM for each inlet or outlet
h. A summarization by system to compare design data to actual

4. Air Handling Units:

a. Design and measured air flow rates
b. Design and measured airside static pressure drops across each coil and across the entire unit
c. Design and measured airside cooling coil entering and leaving dry and wet bulb temperatures
d. Design and measured airside heating coil entering and leaving dry bulb temperatures

G. Other Report Requirements: Where systems have equipment or components which are not covered by the above, the Final Test and Balance Report shall include the following design and measured data as applicable:

1. All duct inlet and outlet areas.
2. All applicable duct, pipe and coil sizes
3. Outside, return, mixed and supply air conditions.
4. All fluid velocities, flow rates, temperatures and pressure differentials at appropriate locations.
5. All speeds.
6. All voltage and ampere ranges.

PART 3 - EXECUTION

3.1 GENERAL

A. Load Conditions: All testing and balancing of systems shall be performed with maximum attainable load. Testing and balancing of all air handling systems shall be accomplished with ceiling tiles in place and enclosing partitions, windows and doors erected.

B. Observation: Observe all equipment and exposed piping for noise, movement or vibrations under normal operating conditions and report unacceptable operation to the Owner.

C. Measuring Stations: Where measuring stations are installed, each is to be read and recorded in hydronic systems, permanent devices such as flow tubes with manometers, annular ring systems, venturi tubes with portable meters, etc. must be used for final measurements after they are completed and calibrated.

D. Adjusting: Testing and balancing is an iterative process and the T&B Agency may have to perform preliminary adjustments, readjustments and final adjustments as necessary to properly tune the systems. This is a integral part of the balancing procedure and must be anticipated; all adjustments, spot-checking required by the Owner and other re-verification shall be performed at no additional cost to the Owner.

3.2 AIR SYSTEMS

A. General: The testing and balancing shall include, but is not limited to, the following requirements:

1. Adjust fan speeds to deliver the required CFM and static pressure, and record rpm and full load amperes. Replace drives as required; increasing static pressure by dampering at the fan is not permitted.
2. Traverse main supply ducts with pitot tube to verify design CFM. Artificially load air filters by partially blanking to produce the equipment or air pressure drops through dirty filters. Mark position of balancing devices.
3. Verify the quantity of outside air and return air when the system is operating in the maximum cooling and full heating modes. Check all controls which regulate flow or pressure for calibration, verify damper positioning and modulation, and flowrate with minimum and maximum outside air.
4. Test and adjust each diffuser, grille and register to within five (5) percent of design requirements, and adjust to minimize drafts and noise in all areas.
5. Observe all equipment and exposed ductwork for noise, movement or vibration under normal operating conditions and report to the Designer.

B. Air Distribution: Adjust air distribution devices to distribute design air quantities. Should the temperature in any area vary more than two (2) degrees from the zone thermostat setpoint, notify Designer and obtain approval to re-balance devices to air quantities other than those indicated so that air temperature in the entire zone will be as even as possible regardless of design air quantities. After obtaining approval, perform necessary re-balancing.

3.3 SYSTEM MEASUREMENT

A. General: Measurements shall be taken to obtain accurate and consistent readings; i.e., sufficiently downstream from changes in direction, regions of turbulence, or flow convergence.

B. Repeatability: Take sufficient readings which when averaged will result in a repeatability error not to exceed five (5) percent. When measuring a single point, repeat readings until two consecutive identical values are obtained. Readings shall be taken with the eye at the level of the indicated value to prevent parallax. Insert pulsation dampeners to eliminate error involved in estimating the median of fluctuating readings.

END OF SECTION 23 08 00

SECTION 232113 - PIPE AND FITTINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Basic Requirements: Provisions of Section 23 05 01, BASIC MECHANICAL REQUIREMENTS, are a part of this Section.

1.2 SUMMARY

A. General: Provide and install pipe and fittings as indicated and including all offsets, fittings, sleeves and similar items required but not necessarily indicated due to drawing scale for complete and operable systems.

1.3 SUBMITTALS

A. General: Provide shop drawing and manufacturer's data sheet for the following items:

1. Manufacturers Literature:

   a. Complete design and construction data for dielectric unions and flanges.
   b. Complete design and construction data for no-hub couplings.
   c. Complete design and construction data for grooved mechanical fittings and couplings for steel piping systems.
   d. Complete design and construction data for grooved mechanical fittings and couplings for copper piping systems.
   e. Manufacturer's data on piping and fittings used, with an indication of each specific application

2. Performance Data: Submit a copy of the Welding Procedure Specification with the Procedure Qualification Record and certificates of the welders and welding operators required by Section IX of the ASME Boiler and Pressure Vessel Code.
3. Installation Data:

   a. Manufacturer's printed installation instructions for no-hub couplings.
   b. Manufacturer's printed instructions for the installation of grooved mechanical fittings and couplings for steel pipe.
   c. Manufacturer's printed instructions for the installation of grooved mechanical fittings and couplings for copper pipe.
   d. UL approval number, installation materials, and procedures for pipe penetrations of fire-rated walls and floor.

1.4 APPLICABLE STANDARDS

A. General: All equipment, material, accessories, methods of construction and reinforcement, finish quality, workmanship and installation shall be in compliance with the applicable standards and codes listed in paragraph entitled "Code Compliance" in Section 23 05 01.

B. Quality and Weight: The quality and weight of materials shall comply with requirements and specifications of the appropriate standards of the American Society of Testing and Materials, American National Standards Institute, American Society of Mechanical Engineers, and the American Welding Society.

C. Piping System: All pressurized piping systems shall conform to ASME B31.9, Code for Pressure Piping, Building Services Piping. All piping systems with services exceeding 250°F. 160 psig and steam and condensate exceeding 15 psig shall meet ASME B13.9, Power Piping.

D. Welder Certification: Welders shall be tested and certified within the last 2 years by the National Certified Pipe Welding Bureau or recognized testing agency acceptable to the Designer. Competent certified welders shall perform all welding operations. Each welder shall possess a stamp to identify his work and shall stamp each weld. A copy of the certification shall be available at the jobsite for each welder.

E. Welding Installation: Welding shall be in accordance with the welding procedures and requirements set forth in "Welding of Pipe Joints" of the "Code for Pressure Piping" in the American Welding Society Welding handbook. Pipe welding shall comply with the provisions of the latest revision of the applicable code, whether ASME Boiler and Pressure Vessel Code, ANSI Code for Pressure Piping, or state or local requirements as may supersede these codes.

F. Brazing: Brazing of copper tubing shall be in accordance with the standards of the American Welding Society, the Copper Development Association Copper Tube Handbook instructions on brazing, and ASME Boiler code Section IX.

G. Soldering: Soldering of copper tubing shall be done in accordance with the Copper Development Association, Copper Tube Handbook instructions on Joining and Forming Copper Tube, Soldered Joints.

H. FMRC: No-hub couplings shall be in compliance with Factory Mutual Research Corporation Standard 1680-89.

I. PVC-DWV: The use of PVC-DWV piping shall be permitted only if written approval is obtained from the local authority having jurisdiction. The written approval shall be included with the submittal of the manufacturer's literature.

PART 2 - PRODUCTS

2.1 GENERAL

A. Application: This section covers the material and installation of various pipe and fittings which may be indicated in other sections of these specifications for use in a specific piping system. Pipe and fittings specified in this section may not be substituted in piping systems for the specific pipe and fitting materials indicated in those individual sections of these specifications.

B. Fittings: Fittings shall be at a minimum the same gauge as the connected piping, and shall be compatible with the piping material (i.e., galvanized fittings on galvanized pipe.) The use of field-fabricated fittings is prohibited.

C. Lead Content: Pipe, fittings or any other piping device which includes any lead in the alloy shall not be used in any potable water system.

D. Connection of Different Pipe Materials: Where different types of above ground pipe material or different weights or schedules of pipe are joined, provide a stainless steel coupling with an elastomeric gasket for the connection. The coupling shall incorporate a full-length shield of 304 stainless steel, with bolts manufactured of 304 stainless steel which tighten the shield around the gasket to provide a solid connection.

2.2 STEEL PIPING

A. Pipe: Black steel pipe shall be seamless or electric resistance weld for pipe sizes 2 inch and above, continuous weld below 2 inch, conforming to ASTM A 53-89a Grade B, ASTM A 106 Grade B, or ASTM A 120 Grade B. Galvanized pipe shall conform to ASTM A 53-89a. Unless otherwise noted, black and galvanized steel pipe smaller than 12 inches shall be schedule 40 and pipe 12 inches and larger shall be standard schedule. The ASTM number shall be marked on each length of pipe.

B. Schedule 10: Black steel schedule 10 pipe shall be continuously-welded and in conformance to ASTM A-135.

C. Fittings:

1. Threaded Fittings: Malleable iron 150 lb. or 300 lb. class conforming to ASTM A-47 and ANSI B16.3, or cast iron 125 lb. or 250 lb. class conforming to ASTM A-234 and ANSI B16.4. Threads shall conform to ANSI B1.20.1, standard pattern.
2. Pipe Nipples: Provide nipples of same material as pipe schedule 80. Threads shall comply with ANSI B1.20.1. Nipples shall not be threaded full-length (no close nipples).
3. Welded Fittings: Forged, seamless, black steel, long radius, conforming to ANSI B16.11 for socket-type welds and ANSI B16.9 for butt-type welds. Weldolet fittings may be used in lieu of forged tees where branch connections are not larger than three-quarters the size of main pipe, except on piping 2 inch and smaller, where forged fittings shall be used exclusively. Mitred elbows, tees and reducers are prohibited.
4. Unions: Unions shall be malleable iron or steel with ground joint on piping 1-1/2 inch and smaller; flanges shall be used on sizes 2 inch and larger. Unions shall conform to ANSI B16.39 with ANSI B1.20.1 threads and shall have hexagonal ball-and-socket joints with bronze metal-to-metal seating surfaces, female ends, and a seat ring pressed into the headpiece so it cannot be forced out.
5. Couplings: All couplings shall be taper tapped. Couplings shipped with pipe are not acceptable.
6. Flanges: Forged carbon steel, welding neck type and lap joint conforming to ANSI B16.5. Flanges shall have raised face and gaskets with bolt spacing for the required pressure classification. Gasket material shall be ring-type, 1/16 inch thick compressed heat-resistant fiber or neoprene; gasket shall not contain any asbestos.

Flange bolts shall conform to ASTM A307 hex bolts, with ANSI B18.2 hex nuts. Black steel flanges shall have galvanized steel bolts and nuts; galvanized steel flanges shall have galvanized steel bolts and nuts.

7. Grooved Mechanical Fittings and Couplings: Mechanical pipe couplings for steel pipe shall be self-centering and shall engage and lock in place the grooved or shouldered pipe and pipe fitting ends in a positive watertight couple. Mechanical couplings shall have a central cavity pressure-responsive housing fabricated in two or more parts of malleable iron castings in accordance with ASTM A47, or ductile iron in accordance with ASTM A536; where pipe is galvanized, couplings shall be galvanized. Mechanical fittings shall be malleable or ductile iron conforming as specified above, or shall be manufactured for fabricated steel complying to ASTM A53 or ASTM A106. Couplings shall have two or more nuts with electroplated oval type ASTM A183 bolts, locking pins, toggles, or lugs as required to secure grooved pipe and fittings. Housing clamps shall hold in place a composition water-sealing gasket designed to allow internal water pressures serve to increase the watertightness of the seal. Gaskets shall be neoprene or EPDM and suitable for use to 230 degrees F. Rigid couplings shall be used for rigid joints, otherwise use flexible-type couplings.

   a. Manufacturer:

      1) Victaulic Company of America
      2) ITT Grinnell Gruvlok
      3) Tyler Pipe
      4) Central Sprink, Inc.

2.3 COPPER ALLOY PIPING

A. Pressure Pipe: Copper piping shall be annealed seamless hard temper type "K", "L" or "M" as indicated and shall comply with ASTM B-88. Copper is allowed for pipe sizes up to and including 4 inch diameter. The name or trademark of the manufacturer and the type of pipe shall be permanently marked on each section of pipe at intervals not exceeding 4-1/2 feet.

B. Refrigerant Piping: Refrigerant piping shall be seamless annealed copper tubing complying with ASTM B280.

C. Drainage Pipe: Non-pressure piping shall be copper type DWV, hard temper and conform to ASTM B306.

D. Brass Pipe: Chrome-plated brass piping shall be schedule 40 conforming to ASTM B43.

E. Fittings:

1. General: Fittings used in copper alloy piping shall be streamlined pattern, wrought or cast brass conforming to ANSI B16.22 or wrought bronze conforming to ANSI B16.15.
2. Flare Fitting: Flare fittings shall be used on soft copper tubing, and shall comply with ANSI B16.26.

3. Union: Unions in 2 inch and smaller copper alloy piping shall be brass or bronze, ground joint for solder connection with hexagonal ball-and-socket joints, bronze metal-to-metal seating surfaces, female ends, and a brass seat ring pressed into the headpiece so it cannot be forced out.
4. Flanges: Flanges shall be used in copper alloy piping larger than 2 inch, and shall comply with ANSI B16.24. Flanges shall have raised face and gaskets drilled for the pressure (class 150 or 300 lb) as required. Gasket material shall be ring-type, 1/16 inch thick compressed heat-resistant fiber or neoprene; gasket shall not contain any asbestos. Flange bolts shall be brass and conform to ASTM A307 hex bolts, with ANSI B18.2 brass hex nuts.
5. Mechanical Couplings: Rolled-groove mechanical couplings and fittings may be used in lieu of solder joints where indicated.
6. Dielectric Isolator: Dielectric couplings shall be rated for at least 150 percent of the maximum working pressure of the piping system and at least 50 degree F. higher than the maximum operating temperature of the piping system in which they are installed. Couplings shall be electroplated steel or brass with inert and non-corrosive thermoplastic lining, or bronze fittings.

    a. Union: Provide dielectric insulating unions in piping 2 inch and smaller with threaded or solder joint connections.
    b. Flanges: Flanged dielectric insulating sets shall be used for pipe sizes 2-1/2 inches and larger. Flanged insulation sets shall have phenolic retainer, nitrile rubber seal element, polyethylene sleeves and double washer.
    c. Manufacturer:

        1) Epco
        2) Watts
        3) Eclipse
        4) Grinnell
        5) Victaulic

F. Drainage Fitting: Fittings for copper DWV shall be cast bronze or wrought copper solder joint DWV drainage fittings complying with ANSI B.16.23 and B.16.29.

2.4 SPECIAL PIPE MATERIALS

A. PVC: Type PVC-DWV pipe and fittings shall conform to ASTM D2665-85, NSF Seal of Approval, solvent-cement joint.

B. PVC: Schedule 40, 80 or 120 PVC piping shall conform to ASTM D1785, socket fittings shall conform to ASTM D2466; threaded fittings shall conform to schedule 80, ASTM D2464.

C. CPVC Piping: Chlorinated Polyvinyl Chloride (CPVC) piping shall conform to ASTM D2846.

D. PVDF: Pipe, fittings and valves shall be manufactured of natural, unpigmented, virgin, and non-compounded Polyvinylidene Fluoride (PVDF) in standard schedule 80 pipe dimensions unless otherwise indicated. Pipe, fittings and valves shall be socket heat-

fusion type, and shall conform to ASTM D-2457, with tolerances in accordance with ASTM D-1785.

E. ABS: ABS (Acrylonitrile-Butadiene Styrene) DWV pipe and fittings shall conform to ASTM D-2661; ABS sewer pipe and fittings shall conform to ASTM D-2751.

F. Plastic to Metal Transitions: Plastic and metal pipe shall be joined by flanges or unions specifically manufactured for the purpose.

G. Ductile Iron Piping: Ductile iron piping shall be class 52. Cement-lined ductile iron piping shall be class 52, with fittings of class 250 cement-lined ductile iron construction. Mechanical joint ductile iron pipe shall conform to ANSI/AWWA C151/A21.51. Mechanical joint shall be stuffing box type construction consisting of a bell with a flange integrally cast, a gray or ductile iron gland, rubber gasketing, and steel bolts and nuts. The bolts used shall be cathodic to the pipe to minimize corrosion.

2.5 JOINT FILLER MATERIALS

A. Solder: Solder containing lead shall not be used in potable water piping; only 95% tin - 5% antimony (95/5) or silver brazing (no substitutions) are acceptable for solder joints in potable water piping. 95/5 and 50/50 tin-lead solder shall conform to ASTM B32.

B. Brazing: Brazing (silver solder) material shall conform to AWS A5.8, classification BAg 1.

C. Welding: All electrodes shall conform to AWS Standards E-6010, E-7010, E-7018 or E-8018-B2, C2, or C3 as applicable.

PART 3 - EXECUTION

3.1 GENERAL

A. Installation: Pipe and fittings shall be installed as specified in this section unless specific installation instructions are provided in the individual sections covering the piping system. Install each run with a minimum of joints and couplings, but with adequate and accessible unions for disassembly and maintenance/replacement of valves and equipment. Reduce sizes where indicated using reducing fittings. Align piping at connections within 1/16 inch misalignment tolerance.

B. Routing and Placement: Piping shall be run without traps or pockets and pitched a minimum 1 inch per 40 feet in the direction of flow, unless indicated or required to be pitched steeper. Grade piping so that air in the mains and risers will be carried up and discharged at venting points. Coordinate installation with structural features, and with other piping, equipment and the work of other trades. All piping shall be installed as close to the structure overhead as possible.

C. Prohibited Installation: Do not run piping through transformer vaults, elevator equipment rooms, other electrical or electronic equipment spaces and enclosures. Do not run piping over electrical panels. Where pipe joints or valves in water lines occur within two feet in horizontal directions from electrical panels or equipment, provide drip pans sized to afford protection. Pans shall be 20-gauge galvanized steel with edges turned up 2-1/2 inches on all sides, reinforced with galvanized steel angles or by rolling edges over 1/4-inch diameter steel wire. Provide a drain with 3/4-inch flange and pipe to nearest floor drain, and support the pan assemblies as required to prevent sagging or swaying.

D. Interior Piping: Interior piping shall be run parallel to the walls and ceilings; avoid diagonal runs. Provide a minimum 6 inch clearance between walls and horizontal piping.

E. Exterior Piping: Exterior piping (above and below grade) shall essentially be routed and located as indicated on the drawings; however, actual placement shall be verified by confirming exact location of structures and other utilities in the field and by careful layout prior to execution of the work.

F. Insulated Piping: Pipe requiring insulation shall be installed with sufficient clearances to permit proper application of insulation.

G. PVC Pipe: PVC piping, fittings and other PVC materials shall not be installed in air conditioning plenums or equipment rooms used as air conditioning plenums.

H. Cast Iron Pipe: Unless otherwise indicated, install 3 inch and larger horizontal storm and waste piping with 1/8 inch per foot slope; piping 2-1/2 inch and smaller shall be installed at a slope of 1/4 inch per foot. Run horizontal vent lines to a minimum grade back to stacks and vertical vent lines as direct as possible.

I. Drains: Install drains at low points in mains, risers, and branch lines consisting of a tee fitting, 3/4 inch ball valve, and short 3/4 inch threaded schedule 80 nipple with hose end and cap.

J. Tool Marks: Copper, brass and chromed, polished or painted piping, fittings and connections to fixtures shall not show tool marks. Replace damaged piping and fittings.

K. Potable Water Solder Joints: Samples of solder in potable water piping may be taken from completed joints and tested for lead. If tests indicate lead, the joints will be condemned and all fittings, valves and pipe ends shall be replaced with new materials where such joints occur at no cost to the Owner.

3.2 EXPANSION AND CONTRACTION

A. Provision for Expansion: Piping shall be installed with provisions for expansion both horizontally and vertically in all long runs including runouts from risers. Expansion loops and expansion elbows shall be provided for expansion and contraction where required and where shown on the drawings.

B. Cold-Springing of Pipe: Cold-spring hot piping systems to reduce the amount of thermal expansion of the piping.

C. Pipe Anchors: Provide pipe anchors as indicated or as required to eliminate excessive piping movement in thermal and pressure piping systems.

3.3 UNDERGROUND PIPING

A. Cover and Excavation: Minimum cover for exterior underground piping is three feet over insulation or pipe unless otherwise indicated. See Article entitled "PROTECTION" in this section for uninsulated underground piping protection.

B. Thrust Blocks: Provide properly sized and placed thrust blocks at all fittings in water and fire mains pressure pipe at every change in direction or where required. Thrust blocks shall bear on and against undisturbed or properly compacted soil. Provide temporary thrust blocking for testing at piping end points and other points as required.

C. Water and Sewer Separation: Underground water piping and building sewer shall be separated with undisturbed or compacted earth at least 10 feet horizontally if installed at the same level or lower than the sewer. Where potable water piping is closer than 10 feet to a sewer line, place the bottom of the water pipe at least 18 inches above the top of the sewer or the sewer shall be encased in a concrete envelope as required.

D. Identification Tape: Place a color-coded 6 inch wide, 0.004 inch thick polyethylene printed plastic identification tape directly above all underground piping systems at approximately 12 inch below finished grade. Tapes shall be continuously printed with "CAUTION" in large bold letters, and the type of service piping shall be indicated on the second printed line. Provide trailer wirre also for assistance in locating.

3.4 JOINTS AND CONNECTIONS

A. General: Align all pipe before joints are made. Joints and connections shall be air, gas and water tight.

B. Steel Pipe Joints: All pipe joints up to 1-1/4 inch shall be threaded; joints in pipe 1-1/2 inch and 2 inch may be socket-type welded or threaded; pipe 2-1/2 inch and larger shall be butt fusion welded.

C. Welded Joints: All welds shall be first quality metal, thoroughly fused to the base metal at all points, free of cracks, oxidation, blow holes and nonmetallic inclusions. The welder shall leave his indelible identifying mark on the piping adjacent to each weld.

D. Testing of Welded Joints: The Designer/OAR may visually spot check welding work anytime. The OAR may also employ an outside testing agency to analyze any of the welded joints for imperfections. All welded joints found by inspection or testing to have imperfections shall be repaired.

E. Threaded Joints: Use ANSI B2.1 threaded joints in piping with a minimum wall thickness of Standard Schedule pipe. Assemble the joint wrench-tight, applying force on the end of the fitting into which the pipe is being joined. If a seam fails during cutting or threading, that portion of pipe shall be discarded. Threaded joints shall have a minimum of 3 threads engaged and a maximum of 3 threads exposed.

F. Solder Joints: Solder joints shall be used on pipe 2-1/2 inches and smaller. Unless otherwise noted the following solder material shall be used:

1. For operating pressures up to 125 psig, 95/5 solder.
2. For operating pressures above 125 psig, silver brazing alloy.

G. Brazed Joints: Solder joints in piping 3 inches and larger, and as otherwise indicated, shall be brazed. Remove stems, seats and packing of valves and accessible internal parts at piping specialties before brazing. Fill the pipe and fittings during brazing with an inert gas (i.e., nitrogen or carbon dioxide) to prevent the formation of scale. Heat joints to a uniform temperature and form a liquidtight circumferential joint seal.

H. Dissimilar Metals: Dielectric unions or flanges shall be provided at all junctions of copper or brass pipe or fittings and ferrous material to prevent electrolysis and galvanic corrosion. Where copper or brass tubing or fittings are anchored, supported, or may come in contact with ferrous piping system materials, isolate the two materials with a non-conducting neoprene spacer.

I. Flanges: Connect pipe flanges to pipe ends in accordance with ANSI B31.1.0 Code for Pressure Piping; clean flange faces and install gaskets. Using a torque wrench, tighten flange to the torque specified by the manufacturer of the flange to provide uniform compression of gaskets.

J. Cut-Grooved Mechanical Couplings for Steel Pipe: Pipe grooving shall be in accordance with the pipe coupling manufacturer's recommendations. Piping shall be cut-grooved, except where indicated. Pipe wall thickness shall be a minimum of Standard Schedule. Before the assembly of couplings, lightly coat the pipe ends and the outside of gaskets with cup grease or graphite paste to facilitate installation. Tighten bolts or lugs to the proper torque as directed by the manufacturer to provide a watertight joint.

K. Rolled-Groove Mechanical Couplings for Copper Pipe: Pipe grooving shall be in accordance with the pipe coupling manufacturer's recommendations. Piping shall be rolled-grooved without removal of any metal. Before the assembly of couplings, lightly coat the pipe ends and the outside of gaskets with approved lubricant or silicone to facilitate installation. Tighten bolts or lugs to the proper torque as directed by the manufacturer to provide a watertight joint.

L. No-Hub: Insert ends the full depth of the gasket. Slide the coupling housing over the gasket, and tighten the clamp to the torque recommended by the joint manufacturer. When special torque wrenches are provided for a joining system, joints shall only be made with these wrenches. Provide one spare special torque wrench to the Owner prior to final acceptance. No-hub fittings shall not be used on underground piping or for pipe sizes larger than 10 inches.

M. Mechanical Joint Ductile Iron Pipe: Follow manufacturer's instructions for lubricating the pipe ends to be joined. Insert plain end into socket end; seat gasket evenly and watertight; affix gland into position and tighten bolts to torque requirements as recommended.

N. Plastic Pipe: Pipe and fittings to be joined by solvent cement shall be wiped clean with a cloth moistened with acetone or methyl-ethyl ketone, in accordance with ASTM D2855.

Apply joint compound to the male threads of screwed fittings. Provide horizontal and vertical support spacing in compliance with the manufacturer's requirements and local codes.

O. Rated Penetrations: Provide UL-approved method of sealing fire- and fire/smoke rated wall and floor penetrations. Submit method proposed prior to installation.

P. Underground Piping: Underground piping connections for different types of piping material shall be limited to grooved coupling, dresser coupling, matching flanges, or mechanical joint with retaining rods.

3.5 EQUIPMENT CONNECTIONS

A. General: Make connections between equipment and piping system with unions, flange joints or other fittings which permit equipment to be disconnected and removed for maintenance. Connections to equipment shall be made in accordance with details on the drawings and the equipment manufacturer's installation instructions. Final connections to equipment shall be made with unions for pipe sizes 2 inch and under and with flanges for pipe sizes over 2 inches.

B. Locations: Provide unions or flanges where indicated, and in the following locations even if not indicated:

1. In long runs of straight piping for water and other non-gaseous services at 60-foot intervals to permit convenient disassembly for alterations and repairs.
2. In bypasses around equipment.
3. In connections to in-line equipment requiring disconnection for repairs and replacement, located between the isolation valve and the equipment.
4. Within 3 inches of each threaded valve and each piece of equipment not having unions or flanges attached.

3.6 PIPE SIZE REDUCTIONS AND ENLARGEMENTS

A. Prohibited Fittings: Screwed bushings are prohibited, except where available space prevents use of reducing couplings

B. No-Hub Clamps: No-hub clamps with bushings shall not be used for pipe size reduction. Cast iron fittings are required.

C. Reducing Couplings: Eccentric reducing couplings shall be installed throughout water piping to prevent air or water pockets occurring due to a change in pipe size. Eccentric couplings on water lines shall bring the pipes flush on top except as otherwise specified or indicated.

3.7 PROTECTION

A. Underground Copper Piping: Paint all uninsulated copper piping underground with two coats of asphaltic paint. Manual wiping is not acceptable.

B. Ferrous Pipe: Wrap all ferrous pipe with a layer of 6 mil polyethylene film or 15 lb. felt.

C. Pipe Embedded in Concrete: Spirally wrap all pipe lines embedded in concrete with two layers of 30 lb. felt.

D. Pipe Thread: Coat all exposed threads on galvanized steel pipe after assembly with two coats of zinc chromate. Remove pipe thread lubricants prior to applying paint.

E. Underground Metal Piping and Equipment: Cathodic protection shall be provided by furnishing and installing insulating couplings, protective coatings, sand envelopes, and sacrificial anodes. After underground piping systems with protective covering have been installed, test for electrical insulation. Make necessary modifications and corrections to any system not electrically isolated. Provide packaged anodes complete with test stations thermoweld connected to the buried materials and equipment to be protected. The location, weight and material of the anodes shall be as indicated on the drawings and installed acceptable to the Designer/OAR.

3.8 FLUSHING AND CLEANING

A. Preparation for Testing: Before final testing, flush piping systems with clean water to remove debris. Disconnect all coils and heat exchangers from the system before flushing. Flush all coils and heat exchangers separately to assure that debris does not become lodged in them. Provide temporary valves and drains as required to accomplish flushing. Minimum water velocity is 2 ft. per second for a period of one hour.

B. Final Flushing: After flushing, thoroughly clean each piping system with appropriate cleanser to remove oil, grease, lacquer, etc. Thoroughly flush each liquid system with clean water.

C. Sterilization of Potable Water Systems: After the final testing for leaks, all new potable water lines shall be thoroughly flushed to remove foreign material. Before placing the systems in service, sterilize the new water lines in accordance with Section 22 05 00.

3.9 PRESSURE TESTING

A. Pressure Test: Prior to insulating and concealing the piping system, apply a water pressure test to all parts of each system before equipment is connected. Use a hydrostatic pressure of not less than 100 psig or 150 percent of system operating pressure whichever is greater. Test system for a period not less than four hours. There shall be no leaks at any point in the system at this pressure.

B. Concealed Work: Leave concealed work uncovered until required tests have been completed, but if necessary, make tests on portions of the work and those portions of the work may be concealed after being inspected and found free of leaks. Make repairs to defects that are discovered as a result of inspections or tests with new materials; caulking of screwed joints, cracks or holes will not be accepted. Repeat tests after defects have been eliminated.

C. Field Testing: Complete all field testing prior to insulating, wrapping or backfilling.

END OF SECTION 23 21 13

SECTION 232300 – REFRIGERATION PIPING SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Basic Requirements: Provisions of Section 23 05 01, BASIC MECHANICAL REQUIREMENTS are a part of this Section.

1.2 SUMMARY

A. General: Provide refrigerant piping systems, complete in all respects, between the system components and connected equipment.

1.3 SUBMITTALS

A. General: Include the following data:

1. Manufacturers Literature:

   a. Dimensional outline drawing showing the location of all equipment piping and electrical connections.
   b. Complete list of piping materials to be used in this section including valves, specialties, pipe material, pipe insulation, pipe sizes and method of connection for each refrigeration piping system.

2. Installation Instructions:

   a. Manufacturer's printed installation instructions for refrigeration piping equipment including copies shipped with the equipment.
   b. Layout of refrigerant piping with reference elevations, pipe sizes, refrigerant velocity and pressure drops between various equipment connections.

1.4 APPLICABLE STANDARDS

A. General: All equipment, material, accessories, methods of construction and reinforcement, finish quality, workmanship and installation shall be in compliance Section 23 05 01.

B. ANSI: All materials and installation shall conform to ANSI B31.5, Code for Refrigerant piping, ANSI/ASHRAE Standard 15, "Safety Code for Mechanical Refrigeration", ASME/ANSI B31.5-1987 (Refrigeration Piping), and ANSI/SAE J513, Refrigerant Tube Fittings.

C. ASME: Provide safety relief valves in conformance with ASME Boiler and Pressure Vessel Code, Section VIII Division I.

PART 2 - PRODUCTS

2.1 GENERAL

A. Application: The refrigeration piping system shall be of the material indicated. See Section 23 21 13, PIPE AND FITTINGS for material specifications.

B. Pipe: Refrigerant system piping shall be refrigerant grade, dehydrated and sealed, seamless, uniformly dead soft anneal to 1-3/8 inch O.D. or hard temper annealed, type K copper tubing conforming to ASTM B280.

C. Fittings: Refrigerant grade, wrought copper, long radius, brazed joint type.

D. Brazing: Silver brazing alloy and non-corrosive flux, designed for silver brazing.

2.2 CHARGING VALVES

A. Quick Couplers: Schrader type designed for use with quick coupler hose fittings and provided with individual cap.

2.3 SPECIALTIES

A. Removable Core Filter-Drier: Provide a removable core filter-drier in liquid line with a full size valved bypass. Provide shut-off valves to isolate the filter drier.

B. Sight Glass: Provide a moisture indicating sight glass in the liquid line downstream from the filter-drier. Install the sight glass in vertical line if possible and a sufficient distance downstream from any valve to eliminate visual disturbance in the glass.

PART 3 - EXECUTION

3.1 GENERAL

A. Pipe Size: Refrigerant pipe sizes indicated are nominal. Provide sizes not less than sizes indicated and in compliance with manufacturer's recommendations. Provide change in sizes in accordance with manufacturer's recommendation and Designer's acceptance. Piping shall maintain a minimum velocity of 500 fpm in horizontal lines and 1000 fpm in vertical risers for proper oil return. Provide double suction risers with oil trap or accumulator and hot gas risers as may be necessary.

B. Flexible Connection: Provide flexible piping in suction and hot gas discharge line of compressor. Flexible piping shall be a 15 pipe diameter loop or similar measure to prevent transmission of vibration.

C. Specialties: Refrigerant valves, driers, expansion valves, and similar items shall be provided with each system. Refrigerant charging valves not furnished by the manufacturer shall be field installed to enable charging and checking the system.

3.2 JOINTS AND CONNECTIONS

A. General: All joints and connections shall be permanently refrigerant tight. Arrange piping generally as shown allowing for service access. Refrigerant lines shall be run as direct as possible with a minimum number of joints. Provide sleeves through floors, walls or ceilings, sized to permit installation of full-thickness insulation. Sleeves shall be sealed air tight after installation of piping and insulation.

B. Brazed Joints: Refer to Section 23 21 13, PIPE AND FITTINGS. All joints shall be brazed unless otherwise indicated.

C. Scale Prevention: Keep pipe system full of inert gas to prevent scale formation while brazing.

D. Hangers and supports: Refer Section 23 05 03. Isolate copper tubing from contact with dissimilar metals.

3.3 EVACUATION AND CHARGING

A. General: Non-factory charged equipment and piping systems shall be evacuated and charged as follows: Charge the system with dry nitrogen to a minimum of 1-1/2 times the working pressure, but not less than 30 psig and leak test all joints including factory piping within the units. Repair all leaks by disassembling and remaking the joint. After all leaks are corrected, evacuate the system to an absolute pressure of 0.2 inches of mercury. System shall hold this vacuum for 4 hours with no noticeable rise in pressure. After the vacuum test, break vacuum twice, flushing with dry nitrogen each time and re-evacuate for a minimum of 2 hours each time. Charge the system in accordance with the manufacturers recommendation and accepted refrigeration practice.

3.4 REFRIGERANT PIPING CONDUIT

A. General: Refrigerant piping below slab or grade shall be installed in Schedule 40 PVC piping. Size conduit to properly install piping. Provide long bend sweeps. Conduit shall drain and not trap water. Protect ends of conduit from entry of vermin, insects and water.

3.5 OTHER REQUIREMENTS

A. Charging Connection: Provide a refrigerant charging connection in the liquid line upstream from the filter-drier.

B. Installation: Keep piping free from traps unless otherwise indicated. Install vertical pipe plumb. Pitch horizontal piping only where slope is desirable to prevent liquid refrigerant or oil from traveling toward the compressor inlet.

C. Valve Locations: Provide shut-off valves at inlet and outlet to all condensers, receivers and evaporators to permit isolation for service. Use angle valves to minimize pressure drop. Use globe valves only when angle valves are impractical. Valves in copper tubing 7/8 inch or smaller shall be mounted independent of tubing supports or fastenings.

D. Solenoid Valves: Provide solenoid valves in upright position in horizontal lines, unless their design allows installation in vertical pipe.

E. Piping Loop: Where compressor does not have pump down control and the evaporator coil does not have bottom suction header connections and is located above the compressor, then loop the suction line to top level of coil to prevent liquid slugging.

F. Expansion Valve Operation: To prevent erratic operation of thermal expansion valve, provide a suction line trap next to evaporator coil suction outlet with a pilot thermostatic expansion valve, a pilot-operated main expansion valve, and expansion valve bulb located between coil and trap. Provide only in suction lines which are level leaving coil outlet or which rise on leaving coil outlet. Trap is not required when evaporator coil outlet suction line drops to compressor or suction header immediately after expansion valve bulb.

G. Insulation: Insulate refrigerant suction line with 3/4 inch elastomeric preformed pipe insulation, unless otherwise noted, in accordance with Section 23 07 00, THERMAL INSULATION.

END OF SECTION 232300

SECTION 233100 – DUCTWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Basic Requirements: Provisions of Section 23 05 01, BASIC MECHANICAL REQUIREMENTS are a part of this Section.

1.2 SUMMARY

A. General: Provide complete duct systems as indicated.

1.3 SUBMITTALS

A. General: Include the following data:

1. Manufacturers Literature:

a. Complete set of published data on factory prefabricated duct construction material including sheet metal gauges, with indication of each material, method of construction, support method, and its intended application and design pressure limitation.
b. Complete set of published data on duct sealant, mastic, and gasket material to be used, including its intended application.

2. Performance Data: Operating pressure for each duct system.
3. Installation Instructions:

a. Manufacturer's printed instructions for the installation of prefabricated ductwork including copies shipped with the material.
b. Manufacturer's printed instructions for the installation of the internal acoustical liner.

B. Shop Drawings:

1. Refer to Section 23 05 01. Provide detailed shop drawings for the following systems:

a. All duct systems.
b. Supply and return systems.
c. All exhaust systems.

1.4 TERMINOLOGY

A. Dimensions: All ductwork dimensions are nominal free clearance internal dimensions which do not include insulation thickness, unless otherwise indicated.

B. Finish: Where ductwork is exposed to view in occupied spaces, provide materials free from visual imperfections including pitting, seam marks, stains and discolorations, and other defects including those which would impair painting. Sheet metal in exposed locations shall be mill-phosphatized unless otherwise indicated.

1.5 APPLICABLE STANDARDS

A. SMACNA: Use material, weight, thickness, gauge, reinforcing, seams and joints, suspension, workmanship and construction and installation methods as outlined in the Sheet Metal and Air Conditioning Contractors National Association, Inc., HVAC Duct Construction Standards, Metal & Flexible. Manufactured round or oval ductwork shall comply with the manufacturer's published recommendations and installation instructions. Where duct gauge and reinforcement is specified for rectangular ducts, the following nominal metal thicknesses shall be used:

TABLE - METAL THICKNESS - DECIMAL INCHES

Metal Gauge	26	24	22	20	18	16	14	12
Galvanized	.0217	.0276	.0336	.0396	.0516	.0635	.0785	.1084

B. HVAC Duct Leakage Standard: Duct leakage test methods, apparatus, and reporting shall comply with the requirements of the SMACNA HVAC Air Duct Leakage Test Manual and as otherwise indicated.

C. NFPA: The duct system, fittings, sealants and accessories shall comply to NFPA 90A requiring a flame spread rating of not over 25 and a smoke developed/fuel contributed rating no higher than 50.

D. Underwriters' Laboratories Rating: All flexible fiberglass duct shall be listed Class 1 by the UL-181 standards rating.

E. AWS: All welded duct shall comply to American Welding Society AWS D9.

F. ASTM: Unless otherwise specified, American Society for Testing and Materials specifications applicable are:

Material	Type	ASTM Number
Galvanized Steel	----	A525
Stainless Steel	302, 304	A480
Cold Rolled Steel	----	A366
Aluminum	3003 H-14	B209

PART 2 - PRODUCTS

2.1 MANUFACTURER:

A. General: Refer to Section 23 05 01.

2.2 GENERAL

A. Special Gauges and Construction:

1. Gauges: Gauges indicated in this section are for galvanized steel. Where gauges are indicated for a material other than galvanized steel, provide the indicated gauge.
2. Flat Oval Duct: Shall be used only on positive pressure systems.

2.3 SHEET METAL DUCTWORK

A. Material: Prime quality 48 inch wide re-square tight coat cold-rolled hot-dipped galvanized steel capable of double seaming without fracture. Conform to the requirements of ASTM A-525 and ASTM-G90 for a minimum galvanizing coat of 1.25 ounces per square foot total for both sides.

B. Square and Rectangular Duct Connections: Manufactured air duct connections with gasket tape, integral mastic sealer and bolted connections maybe used for transverse joints.

1. Manufacturer:

a. Ductmate Industries, Inc.
b. Approved substitution

C. Round and Oval Ducts: Manufactured round and oval ducts may be used provided they comply with the manufacture's published standards.

1. Manufacturer:

a. United-McGill
b. Semco
c. Approved substitution

2.4 FLEXIBLE DUCTS

A. Insulated flexible ducts, Fiberglass: Flexible duct shall be factory-fabricated pre-insulated type with seamless vapor barrier. Fiberglass insulation shall be nominal 1 inch thickness with maximum thermal conductance of 0.23 BTU/hr-sq.ft.-degree F. at 75 degree F. mean temperature. Flexible duct shall have an operating pressure range of minus 0.5 inch w.g. to plus 2 inch w.g., maximum working velocity to 4000 fpm and temperature range to 250 degree F. Core shall be continuous and consist of aluminized mylar laminated to a

corrosion resistant steel wire helix. Vapor retardant rating shall be 0.17 perm maximum per ASTM E96-A.

1. Manufacturer:

    a. Thermoflex
    b. ATCO
    c. Approved substitution

B. Insulated flexible ducts, solid inner wall: Flexible ducts with solid inner wall shall be pre-insulated with a minimum of one inch thick, one pound density fiberglass. The fiberglass shall be protected by a non-combustible minimum 2.5 mil thick polyethylene vapor barrier. The inner wall shall be single-ply aluminum with interlocked seams to provide an airtight and impervious layer between the fiberglass insulation and the moving airstream. The solid inner wall flexible duct shall be tested in accordance with the requirements of UL Standard 181 and shall be UL listed as a Class I flexible air duct connector, the operating range shall be up to 200 degrees F., and a working pressure of 10 inches of positive or negative static pressure.

1. Manufacturer:

    a. Clevaflex
    b. Approved substitution

2.5 MISCELLANEOUS

A. Support materials: Angles and other structural shapes used in connection with galvanized steel sheets shall be zinc-coated steel. Hanger rods shall be minimum 3/8 inch diameter, hot-rolled mild steel. Rivets, screws, and other accessories shall be made of the same materials as the duct or casing. Minimum screw size shall be No. 8 and minimum rivet diameter shall be 5/32 inch.

B. Sealant/Mastic: Low-odor, oil-resistant, non-hardening migrating mastic or liquid neoprene-based cement, applicable for fabrication or installation, shall be used as compounded specifically for sealing fitting components or longitudinal seams in ductwork. Oil- or asphalt-based caulking compounds are not acceptable.

1. Manufacturer:

    a. Childers
    b. H. B. Fuller/Foster
    c. United McGill
    d. 3M

C. Gaskets: Gasket material shall be soft elastomer butyl or neoprene rubber formed for the specific application.

PART 3 - EXECUTION

3.1 GENERAL

A. Criteria: All duct systems shall be furnished and installed free of noise, chatter, vibration, breathing and pulsation under all conditions of operation. Remove, replace or reinforce to correct adverse conditions. Fiberglass duct is not allowed on the project.

B. Field Conditions: If field conditions are determined to exist which would limit the guarantee of air delivery or system performance, submit notice in writing to the Designer. Prior to ductwork fabrication, verify dimensions at the site, making field measurements and drawings necessary for fabrication and erection. Take precautions to avoid space interferences with beams, columns, joists, pipes, lights, conduit, other ducts, equipment, etc. Make necessary revisions to routing where any spatial or coordination conflicts appear, at no additional cost to the Owner or change in the contract price.

C. Preparation for Installation: Ductwork shall be shop-fabricated in lengths sufficient to minimize the number of joints, and shall be preassembled in the shop to the greatest extent possible to minimize field-assembly of the system. Space duct joints to avoid cutting when installing branch takeoffs, outlet collars, etc. Disassemble ductwork only to the extent necessary for shipping and handling; match-mark sections for re-assembly and coordinated installation. Install concrete inserts for support of the ductwork in coordination with the formwork to avoid delays.

D. Installation: Properly support and align ductwork accurately at connections within 1/8 inch misalignment tolerance. Ducts shall be free of sags and bulges. Hang ductwork below concrete floors or roof deck with hangers set prior to pouring concrete, or from self drilling screw anchors. Gun powder set anchors are not permitted. Locate duct runs, except as otherwise indicated, vertically and horizontally, avoiding diagonal runs wherever possible. Parallel runs of horizontal ducts shall be grouped together on trapeze or strap hangers. Hold ducts as close to the structure above as possible. Maintain a minimum 6 inch clearance between walls and duct or duct exterior insulation for inspection.

E. Duct Cleaning: Continuously cap open ends of ductwork to prevent entry of dust, debris and foreign material throughout the installation. Where the interior of ductwork has been exposed to dust or debris, clean the interior of the entire ductwork system from the point of debris entry to the duct termination.

F. Duct Penetrations: Where it is necessary that ducts be divided due to pipes or other obstructions which must pass through these ducts, provide air-stream deflectors in the duct and increase the duct size to maintain equivalent area around the deflectors. Such changes shall be in accordance with standard SMACNA details and shall be shown on As-Built Drawings.

G. Interior Duct Painting: Interior of ductwork visible through registers, grilles, or diffusers shall be painted flat black.

H. Prohibited Duct Locations: Do not route ductwork through transformer vaults, or into electrical rooms or elevator equipment spaces unless the ductwork is dedicated to serving that space. Do not install ductwork over elevator equipment, electrical distribution panels or motor control stations.

I. Balancing Devices: Due to clarity of the drawings, not all duct balancing dampers may be indicated. However, provide each duct branch and each duct takeoff with a balancing damper to assure correct balance and quiet distribution of indicated air quantities.

J. Equipment Connections: Provide and install all duct connections to air handling units and fans and provide flexible connections, elbows and bends which minimize noise and pressure drop. Provide and install all necessary blank-off safing plates or transitions required to facilitate installation. Provide flexible connections between ductwork and all rotating or vibrating equipment.

K. Coordination: Coordinate dimensions at interfaces of dissimilar type of ductwork and at interfaces of ductwork with equipment so that proper overlaps, interfaces, etc., of insulation and continuity of vapor barriers are maintained. Where ducts of two dissimilar metals meet, the joints shall be installed such that the metals do not contact each other.

L. Exterior Insulated Duct: Provide a seamless insulation finish around damper operating quadrants, splitter adjusting clamps, access doors, and similar operating devices with a metal collar equivalent in depth to insulation thickness and suitably sized to which insulation may be finished.

3.2 SHEET METAL DUCTS

A. Construction: Provide corner closures. Longitudinal seams and transverse joints shall be flat and smooth inside. Make slip joints in direction of air flow. Longitudinal joints shall be Pittsburgh lock or double corner seam. Button punch snaplock construction is not acceptable. All welds shall be continuous and corrosion-resistant. Sealant shall be applied over the continuous length of every seam.

B. Fittings: Fabricate offsets, turns and elbows with centerline radius equal to 1-1/2 times diameter when possible. No mitered offsets will be allowed.

C. Round/Oval: Use manufactured ductwork where round or flat oval is indicated. Where round or oval low pressure ductwork is designated to have internal acoustical/thermal liner, provide factory-fabricated double-wall ductwork.

D. Vapor Retardant: Where exterior-insulated ductwork connects to ductwork without exterior insulation, the exterior insulation shall overlap the connecting duct a minimum of 4 inches. The vapor retardant on the exterior insulation shall be sealed to the exposed metal duct.

3.3 FLEXIBLE DUCTS

A. Installation:

1. Flexible duct shall be a maximum of 6 feet in length on inlets to diffusers, unless otherwise indicated and shall be fully extended to smooth out internal corrugations, and shall be installed without kinks, compression or obstructions so that pressure drop is minimized. Install with a maximum equivalent of two 90 degree bends. No bend shall be made with centerline radius of less than four and one-half diameters for metal ductwork. No additional flexible duct shall be provided for future relocation unless otherwise indicated; cut and remove excess length.

2. Flexible duct shall be supported at ends and at each 90 degree bend. Maximum permissible sag is 1/2 inch per foot of spacing between supports.

3. Hanger and saddle material in contact with the flexible duct shall be of sufficient width to prevent any restriction of the internal diameter of the duct when the weight of the supported section rests on the hanger or saddle material. In no case will the material contacting the flexible duct be less than 1 inch wide. Hanger shall be used in conjunction with a sheet metal saddle formed to cover one-half the circumference of the outside diameter of the flexible duct and shall be rolled to fit neatly around the lower half of the duct's outer circumference.

4. Factory installed suspension systems integral to the flexible duct are an acceptable alternative hanging method when manufacturers recommended procedures are followed.

5. To prevent tearing of vapor retardant on fiberglass duct, do not support entire weight of flexible duct on any one hanger during installation. Avoid contact of flexible duct with sharp edges of hanger material. Damage to vapor retardant may be repaired with vapor sealant tape. If internal core is penetrated, replace flexible duct.

6. Connect flexible ductwork to collars on rigid ductwork with locking clamps and adhesive.

7. Terminal devices connected to flexible duct shall be supported independently of the flexible duct.

3.4 SUPPLY, RETURN, INTAKE, EXHAUST AND RELIEF DUCTWORK

A. General Air Moving Systems: Ductwork shall be constructed of galvanized sheet metal unless otherwise indicated and shall comply with SMACNA Pressure Classification.

B. Minimum Requirements: Unless otherwise indicated all ductwork shall comply with the following minimum pressure requirements:

1. 2 inch w.g. Pressure:

a. From the return air inlet device to the inlet of the return fan or air handling fan return connection.
b. From the supply fan discharge to supply registers (Single Zone System).

2. 1 inch w.g. Pressure:

a. From the room exhaust device to the inlet of the roof exhaust fan.

3. All supply, return and outside air ducts shall be externally insulated unless specifically indicated to be internally insulated, extending from supply fan discharge, throughout system, to all outlets. Unless otherwise indicated, external insulation shall be a minimum 2 inch thick fiberglass duct wrap where concealed and 1-1/2 inch thick duct board, where exposed; finish as specified.

C. Toilet exhaust, general exhaust: Ductwork shall not have internal insulation, and does not have to be externally insulated unless otherwise indicated.

3.5 CHANGES IN SHAPE OR DIMENSION

A. Criteria: Where duct size or shape is altered to effect a change in area, the following shall apply:

1. Do not exceed a slope of 1 inch in 7 inches for transitions with increasing area.
2. Do not exceed a slope of 1 inch in 4 inches for transitions with decreasing area; 1 inch in 7 inches is preferable and should be used wherever possible.
3. Transition angles shall not exceed 30 degrees at inlet connections to coils or other equipment, nor 15 degrees at outlet connections.

3.6 MATERIALS AND APPLICATIONS FOR SEALING DUCTS

A. Liquid Sealant: Use only for slip type joints where sealant is to fill space between overlapping pieces of metal. Do not use where metal clearances exceed 1/16 inch.

B. Mastics: Use in lieu of liquid sealant as a filler, in grooves and between flanges.

C. Tape: Tape is not allowed to seal sheet metal ducts.

D. Combination of mastic and embedded fabric: Use mastic/mesh/mastic layers as a sealant where pressure equals or exceeds 3 inch w.g. and where any space between metal surfaces at transverse joints, longitudinal seams or duct wall penetrations exceeds 1/16 inch.

E. Surface preparation: Surfaces to receive sealant should be free from oil, dust, dirt, rust, moisture, ice crystals and other substances that inhibit or prevent bonding. Use solvent and apply a face primer if necessary to obtain a clean surface for adhesion.

F. System Preparation: Remove all dirt and foreign material from the entire duct system and clean diffusers, registers and grilles before operating fans.

3.7 DUCT ACCESS DOORS

A. General: All supply and return ductwork including outdoor air intakes shall be provided with access doors to access fire dampers, smoke dampers, or other duct mounted equipment. Refer to Section 23 33 00.

B. Location: Duct access doors shall be located such that they may be accessed by a person standing on a ladder. Access doors located above a ceiling shall not be more than 42 inches above the ceiling unless a work platform is provided. The access doors may be located on the sides or bottom of the ductwork.

C. Size: Refer to Section 23 33 00.

END OF SECTION 233100

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SECTION 233300 – DUCTWORK SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Basic Requirements: Provisions of Section 23 05 01, BASIC MECHANICAL REQUIREMENTS are a part of this Section.

1.2 SUMMARY

A. General: Provide necessary duct system accessories to assure balanced, quiet and draftless distribution and conveyance, with minimum of turbulence, noise and pressure drop for supply, return, exhaust and ventilation systems indicated.

1.3 SUBMITTALS

A. General: Include the following data:

1. Manufacturers Literature:

a. Dimensional outline drawing of the following products:

1) Flexible duct connection.
2) Splitter damper.
3) Turning vanes.
4) Air extractors.
5) Manual volume dampers.
6) Backdraft dampers.
7) Fire dampers.

2. Installation Instructions:

a. Manufacturer's printed installation instructions for each of the products listed including copies shipped with the equipment.

1.4 APPLICABLE STANDARDS

A. General: All equipment, material, accessories, methods of construction and reinforcement, finish quality, workmanship and installation shall be in compliance with the applicable standards and codes listed in Section 23 05 01.

B. SMACNA: Use material, weight, thickness, gauge, reinforcement, seams and joints, suspension, workmanship, construction and installation methods as outlined in the Sheet Metal and Air Conditioning Contractors National Association, Inc. HVAC Duct Construction Standards, Metal & Flexible, or in accordance with the manufacturer's recommendations.

C. NFPA: The duct fittings, accessories and sealants shall comply to the requirements with NFPA 90A, requiring a flame spread rating of not over 25 and a smoke developed/fuel contributed rating no higher than 50.

D. AWS: All welding of fittings and accessories to ductwork shall conform to American Welding Society AWS D9.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. General: Refer to Section 23 05 01. Model numbers or product type listed for manufacturers are given to provide an example of the item required.

2.2 GENERAL

A. Clear Dimensions: Ductwork dimensions indicated which may affect items of this section are nominal free clearance internal dimensions, not including interior insulation thickness, if any.

B. Gauges: Gauges indicated in this section are for galvanized steel. Where gauges are specifically indicated for a sheet metal material other than galvanized steel, provide the indicated gauge.

2.3 FLEXIBLE DUCT EQUIPMENT CONNECTION

A. Flexible Duct Connections: Duct Connector shall be a waterproof neoprene-coated polymer fabric specifically manufactured to provide an airtight flexible connection between ductwork and rotating or vibrating equipment. Minimum tear and tensile strength shall be 125 and 300 pounds respectively.

1. Manufacturer:

a. Ductmate Proflex Vinyl
b. Durodyne
c. Ventfabrics
d. Or Approved Equal

2.4 SPLITTERS

A. General: Provide splitters for adjustment of air volume to the respective branches where indicated, constructed of the same material and at least the same gauge as the duct, but not less than twenty-two gauge. Use in duct systems to 2 inches w.g. only. Splitters shall be rigidly attached to pivot rod and operating linkage; install on raised insulated base when used in internally insulated ductwork. Splitter blades shall be formed in two thicknesses of metal with a rounded edge to air flow.

B. Manufacturers:

1. Ventlock
2. Ruskin
3. Metalaire
4. Or Approved Equal

2.5 TURNING VANES

A. General: Turning vanes shall be completely flutter-proof; permanently fixed type aluminum, steel with acid/solvent chemical corrosion resistant coating, or galvanized steel. Turning vanes shall be minimum 24 gauge for single thickness and 26 gauge for double thickness and airfoil vanes. Turning vanes shall be securely fastened to a runner; vane edges shall project airflow parallel to duct sides. Airfoil-type turning vanes shall be constructed of galvanized steel or aluminum with a sound-attenuating fiberglass inner liner and open protective metal facing.

B. Manufacturer and Type:

1. Barber-Coleman, Airturns
2. Dura-Dyne, VR
3. Hart & Cooley
4. Or Approved Equal

2.6 EXTRACTORS

A. General: Extractors shall deflect, proportion and direct the indicated air quantities to the branch duct and to the registers, grilles or other outlets without causing objectionable noise or pressure drop.

B. Adjustable Multi-vaned: Multi-vaned with vanes on 1 inch centers where required to have shutoff capability or unless otherwise indicated; adjustable gang-operated and synchronized to remain parallel to flow regardless of extractor angle.

1. Minimum .040 thick aluminum, steel with acid/solvent chemical corrosion resistant coating or galvanized steel

C. Actuator: Provided with manual actuator devices for adjusting and securing the position of these deflectors; these devices shall allow adjustment of the deflectors from outside the ductwork without puncturing or penetrating ductwork or its vapor barrier. Provide remote actuator assembly where required.

D. Manufacturer and Type:

1. Titus, Model AG-45 or AG-225 Volume Extractor
2. Waterloo, Type DTM or DT2M Extractor
3. Anemostat, DTB or DTA
4. Young Regulator, 890 or 890A
5. Or Approved Equal

2.7 MANUAL VOLUME DAMPERS

A. General: These dampers are other than those specified as being integral with a register, diffuser or other air outlet or inlet.

B. Criteria: Volume dampers shall meet the following criteria:

1. For ducts up to 100 square inches in area, use single blade dampers of minimum 20 gauge.
2. Opposed blade type multi-blade dampers shall be a minimum 4 inch deep and fabricated of minimum 16 gauge galvanized steel blades with a welded 16 gauge galvanized steel channel frame; sheet metal screws shall not be used in the construction of any damper. Blades shall ride in bronze bushings on 3/8 inch steel shafts suitable for motor operation. Damper blades shall be operated by a common linkage, with a 6 inch maximum blade width, and shall be formed with double 90 degree bends to ensure positive air lock and maximum strength. Blades shall be felt-tipped to ensure tight closure and noiseless operation, and shall be capable of opening to a full 90 degrees; damper linkage shall incorporate a positive 90 degree opening stop.
3. Dampers shall be made of galvanized steel, stainless steel, steel with acid/solvent chemical resistant coating, or steel sprayed or dipped aluminum rust resistant finish as required to match the attached duct material; stiffened and fabricated to prevent vibration and flutter.
4. Damper adjustment shall be from outside the completed ductwork without puncturing or otherwise penetrating the ductwork or its vapor retardant.
5. Dampers shall be fully adjustable and with locking device and damper position indicator. The damper and damper frame may be fabricated in one section to 48 inch in width and 90 inch in height; larger sizes shall be made in sections with mullions.
6. Pressure drop through the damper shall not exceed 0.03 inches w.g. at 1000 fpm velocity based on the damper face area. The damper shall have full shutoff capability, with leakage rates less than 10 cfm/square ft of damper face area at 4 inches w.g. Airfoil opposed blade dampers shall be provided if the velocity through a fully opened damper exceeds the manufacturer's printed maximum velocity limit.
7. Manufacturer:

a. Air Balance, Inc.

b. Greenheck
c. Louvers and Dampers
d. Penn
e. Ruskin
f. Young Regulator Co.

2.8 BACKDRAFT DAMPERS

A. General: Backdraft dampers shall be the multi-blade, weighted type with counter-balanced blades. Damper frame shall be aluminum or galvanized steel suitable for flange and gasket connection to ductwork. Blade edges shall have vinyl or polyurethane foam gasketing with ball bearings.

B. Manufacturer:

1. Air Balance
2. Louvers & Dampers
3. Ruskin
4. Or Approved Equal

2.9 DUCT ACCESS DOORS

A. General:

1. Doors shall be factory prefabricated double wall, 24 gauge galvanized steel. Access doors shall be able to withstand the same test pressures without deformation, vibration or leakage as the ductwork and casings in which they are installed.
2. Access door minimum size shall be as large as is compatible with the duct size but in no case less than the following (provide larger sizes if necessary to permit proper access operation):

Maximum Duct Dimensions	Access Door Size
11" and less	10" x 12"
12" through 16"	12" x 16"
17" and over	16" x 24"

B. Latches: Doors shall be provided with adjustable tension catches and shall be gasketed around their perimeters with felt or soft rubber gasketing attached to the doors with cement and countersunk rivets for an airtight seal. Access doors less than 24 inch in height shall have a continuous piano hinge (or two 1 inch by 1 inch butt hinges where concealed) and one panel latch; access doors in casings and ducts 24 inch in height and over shall have two heavy butt hinges and two pairs of lever-type latches operable from both sides of the door, installed to open against air pressure. Access doors shall be fastened with spring clips which release in the event of sudden negative pressure, such as created when a damper closes, to prevent duct implosion.

C. Indicators: Where access doors are concealed in hung ceiling, provide indicator buttons in the ceiling immediately below the access door.

D. Insulated: Insulated access doors shall have a minimum 1 inch rigid 6-pound density fiberglass board between the inner and outer panels.

E. Manufacturer:

1. Ventfabrics, Inc., Ventlok
2. Ruskin
3. United Sheet Metal
4. Or Approved Equal

2.10 FIRE AND COMBINATION FIRE/SMOKE DAMPERS

A. General:

1. Fire and combination fire/smoke dampers shall comply with Underwriters Laboratories (UL) Standard 555 and bear the UL test label with a 1-1/2 hour fire protection rating for penetrations in 1 hour and 2 hour rated partitions, and a 3 hour fire protection rating for penetrations in 3 hour rated partitions. Dampers shall be tested under dynamic load. Smoke control dampers, combination fire/smoke dampers and their operators shall comply with UL Standard 555S, and be listed for airflow in either direction to permit use in an engineered smoke evacuation system and to permit installation with the actuator outside the chases.
2. Dampers shall be selected so that the free air space is not less than the connected duct free area.

B. Manufacturer:

1. Prefco
2. Ruskin Mfg. Co.
3. Greenheck
4. Nailor Industries
5. Penn

C. Fire Dampers: The damper casing shall be 11 gauge galvanized steel with bonded red acrylic enamel finish. Interlocking damper blade assembly shall be unaffected by corrosion or high heat. Unless otherwise indicated, damper blade assembly shall be curtain-type located out of the airstream; where multi-blade dampers are used (typically only at grilles and registers) they shall be spring-driven airfoil blades with a maximum pressure drop of 0.1 inch w.g. at 2500 fpm air velocity. Mechanical parts shall have bronze non-corrosive pins. Fire dampers shall close automatically and remain tightly closed by a catch mechanism upon the operation a fusible link rated at approximately 160-165 degree F. Where indicated on the drawings, linkages shall be rated to 286°F. Provide factory furnished duct installation sleeve of minimum 16 gauge for dampers up to 36 inch wide x 24 inch high and 14 gauge for larger sizes.

D. Combination Fire/Smoke Dampers: Dampers shall comply with the requirements for fire dampers listed above. Damper actuator shall be spring-return fail-safe, linked to the damper for normally-closed operation upon loss of control signal, and able to close the damper at pressures encountered in normal operation, including airstream loading effects on the blades. Damper blade assembly shall be airfoil type with a maximum pressure drop of 0.1 inch w.g. at 2500 fpm air velocity. Damper air leakage rate shall not exceed the requirements of Class I with a maximum of 4 cfm per square foot at 1 inch w.g. pressure. Damper actuator shall be mounted out of the air stream, and actuator and mounting bracket shall not extend beyond the height of the damper frame. Provide damper with fusible link set to initiate closing at 165 degree F. duct temperature. Damper actuator shall be able to be remotely closed and remotely reset. Damper actuator shall be operated by 24 volt ac.

PART 3 - EXECUTION

3.1 GENERAL

A. Transitions: Provide and install transitions where required for final connection to any duct fitting, accessory, device or duct-mounted equipment.

B. Location and Use of Dampers: Install a volume damper at each duct branch, as far as possible upstream from air inlets or outlets, to attenuate noise transmission caused by damper throttling. Where the necessary pressure drop across a single volume damper becomes excessive and cannot be reduced through the use of splitter dampers or extractors and creates objectional noise in the opinion of the Designer, an orifice plate shall be installed. The orifice plate shall be sized to provide sufficient pressure drop to allow the volume damper to control the air flow without any objectional noise transmission. Use splitter dampers, extractors or orifice plates only where manual volume dampers will not accomplish the intended balancing, or where indicated. The use of splitter dampers, extractors or orifice plates shall not eliminate the need for specified or required manual dampers.

C. Duct Mounted Smoke Detectors: Install duct mounted smoke detectors where indicated in strict accordance with manufacturer's recommendations.

3.2 TURNING VANES

A. General: Install turning vanes for all short-radius elbows where the centerline radius is less than 1-1/2 times the duct width, and all square corner bends with a transition angle greater than 30 degrees. Install vanes in sections or use tie rods to limit the unbraced vane length. Turning vanes shall be single-wall type for ducts with a vane runner length less than 18 inch and air velocity less than 2500 fpm; duct systems with longer runner lengths or higher air velocities shall use double-wall vanes. Airfoil-type vanes shall be used wherever the duct static pressure exceeds 2 inches w.g. If the duct size changes in a mitred elbow, the vanes shall be fitted with a trailing edge extension.

3.3 DUCT ACCESS DOORS

A. General: Provide and install an access door in the ductwork for each fire, smoke, fire/smoke and motorized damper; in-line duct heater and coil; permanent test ports; and where access for observation or maintenance is necessary.

3.4 FLEXIBLE DUCT EQUIPMENT CONNECTIONS

A. General: Provide flexible duct connections where air handlers, fans and blowers connect to their ductwork. Flexible duct connections shall be installed as follows:

1. Connections shall be at least 4 inches long and shall not be stretched tight or have any metal touching. The flexible material shall not be skewed.
2. Connections shall be attached on each side to metal (either metal ductwork, air handling apparatus, or heavy gauge steel sleeves).

3.5 FIRE, SMOKE AND COMBINATION FIRE/SMOKE DAMPER

A. General: Fire damper assemblies shall be sealed for air leakage prior to installation. Sealing of holes in the corners of the frame shall be done with fire retardant mastic.

B. Access: Provide access doors at each fire damper and combination fire/smoke damper, on the same side of the partition as the actuator, with door size and location which will facilitate replacing fusible links and resetting the damper. The access door shall be insulated when installed in insulated ductwork. Exterior duct insulation around the insulated access door shall be sealed to provide a continuous vapor barrier.

C. Damper Location and Type: Fire and combination fire/smoke dampers shall be installed to provide a positive barrier to the passage of air when in a closed position, and shall be installed to be self-supporting in case of duct destruction due to heat. Care must be exercised that the frame is set so that the closing devices on fire, smoke and combination dampers do not bind. All dampers shall be secured by retaining angles fastened to the sleeve in the wall or floor which they penetrate. The entire outside perimeter of the duct penetration and each angle shall be caulked with a mastic which has a flame spread rating of not exceeding 25 and a smoke developed/fuel contributed rating not exceeding 50. Smoke and combination fire/smoke dampers shall be installed with allowances for the actuator and access to the actuator.

1. Install curtain type fire dampers in ducts where indicated on drawings at locations other than grilles and registers.
2. Install multi-blade type fire damper behind registers and grilles where the stackhead penetrates a fire rated partition.

D. Fire/Smoke Damper Operation: Provide all interconnection wiring, tubing, relays, etc. to operate the fire/smoke dampers such that when each air handling unit is shut down (power to the fan motor is disconnected) the dampers associated with that air handling unit will close; whenever the fan motor is energized the associated fire/smoke dampers will open.

3.6 TEST OPENINGS

A. General: Furnish and install capped test openings for test equipment (pitot tubes, etc.) on the entering and leaving sides of air handling units, duct-mounted coils and other airside equipment. Locate these test openings in each main supply duct at the downstream end of the straightest run of the main before the first take-off. Form test ports by drilling as many evenly-spaced 7/16 inch holes in the duct as will fit on maximum 8 inch centers, lined up perpendicular to the airflow. Holes shall be sealed with replaceable plastic plugs, and shall be made accessible through exterior insulation for future balancing.

3.7 FITTINGS AND TRANSITIONS

A. Divided Flow Fittings: All divided flow fittings shall be furnished as separate fittings; tap covers welded into spiral duct sections are not acceptable. All tees, crosses and laterals up to and including 12 inch diameter shall have a minimum 3/8 inch radius rounded entrance into the tap, produced by machining, press forming or hand-grinding smooth and free of projections, weld build-up, burrs or irregularities. All round duct tees and crosses shall be the spun conical converging type for branch entrances, with a raised bead on the throat of the fitting to assure a tight positive connection. Lateral and Y-type fittings shall be constructed so that airstream converge or diverge at angles of 45 degrees or less.

B. Construction: All welded fittings shall have continuous welds along all seams.

C. Flexible Duct Connectors: Provide spin-in type connector fitting with balancing damper at all connections between rigid sheet metal duct and flexible duct at the upstream end of the flexible duct.

D. Branch Takeoffs: Unless indicated otherwise, branch takeoff connections shall be made with 45 degree laterals or 45 degree elbows. Where 90 degree branches are shown, provide conical tees or "shoe" fittings at a 45 degree entry, with a lockable quadrant damper.

E. Elbows: Elbows shall be die-stamped or multiple-gore construction with seam circumferential joints unless shown as mitred square elbows with turning vanes, except elbows 8 inch in diameter or less shall be die-stamped. All offsets in excess of 30 degrees shall have radius fittings with a minimum 1.5 ratio; provide turning vanes in all elbows and bends as specified herein.

END OF SECTION 233300

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SECTION 233400 – FANS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Basic Requirements: Provisions of Section 23 05 01, BASIC MECHANICAL REQUIREMENTS, are a part of this Section.

1.2 SUMMARY

A. General: Provide fans as specified herein and of size, type, capacity, and electrical characteristics indicated.

1.3 SUBMITTALS

A. General: Include the following data:

1. Manufacturers Literature:

   a. Dimensional outline drawing for each of the specified fans including operating weight.
   b. Dimensional drawing of roof curbs as applicable.

2. Performance Data:

   a. Fan brake-horsepower for each fan at scheduled static pressure including drive losses.
   b. Actual motor horsepower, voltage and phase for each fan.
   c. Fan curve for each fan indicating flow, static (or total) pressure developed, efficiency, and fan speed at the design point.
   d. Fan sound power levels for each fan at operating conditions.
   e. Vibration isolators for each fan located inside the building.

3. Installation Instructions: Manufacturer's printed instructions for the installation of each type of fan including copies shipped with the equipment.
4. Maintenance Instructions: Manufacturer's printed instructions for the maintenance of each type of fan provided.

1.4 APPLICABLE STANDARDS

A. General: All equipment, material, accessories, methods of construction and reinforcement, finish quality, workmanship and installation shall be in compliance with Section 23 05 01.

B. Certification: AMCA certified as to both sound and performance ratings, and in compliance with the requirements of ARI Standard 670.

C. NFPA: Standard 90A, "Installation for the Installation of Air Conditioning and Ventilating Systems".

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. General: Refer to Section 23 05 01.

1. Greenheck Fan and Ventilator Corp.
2. Big Ass Fans
3. Loren Cook Company
4. Acme Engineering and Manufacturing Company

2.2 GENERAL

A. Bird Screen: Provide removable bird screens, 1/2" mesh, 16 ga. aluminum or brass wire on each fan unless otherwise noted on the drawings.

B. Backdraft Damper: Provide gravity-actuated louvered backdraft damper for each fan unless a motorized control damper is noted on the drawings. Damper blades shall be aluminum construction, with felt on the trailing edges to assure a tight closing seal.

C. Vibration Isolation: Isolate the entire rotating assembly and motor of each fan to prevent the transmission of vibration into the structure.

D. Fan Motor: Refer to Section 23 05 02. A disconnect switch inside the fan housing is not a requirement. Unless specifically indicated otherwise air handling unit fan motors shall be selected as follows:

1. Less than 5 hp; 135 percent of bhp
2. 5 Hp through 25 hp; 125 percent of bhp
3. Greater than 25 hp; 115 percent of bhp

E. V-Belt Drive: Refer to Section 23 05 03 for requirements for all belt driven fans.

F. Speed Control: Provide a solid-state speed controller for each direct drive motor. Speed controller shall enable full modulation of motor between 40-100% of nameplate capacity for fan balancing.

2.3 IN-LINE FAN

A. Centrifugal Type:

1. Housing: Fan housing including longitudinal, traverse, and diagonal stiffeners, motor mounts, bearing and drive supports shall be constructed of steel. Housing, including all bracing, stiffeners and motor mounting assembly shall be factory finished with a baked on alkyd enamel finish over a corrosion resistant primer. Provide a removable panel in bottom or side of housing for complete access to motor and fan.
2. Fan: Shall be centrifugal type and shall be statically and dynamically balanced.
3. Fan Motor: Permanently lubricated shaded pole motor mounted on resilient isolators to minimize vibration and noise.
4. Discharge Damper: Mounted in throat of fan discharge.
5. Drive Assembly: Drive shall be direct or v-belt type as indicated.
6. Speed Control: Solid state speed controller for speed reduction to 40 percent. Mounted on housing or as otherwise indicated.

B. Manufacturer: Greenheck, Cook, or Ilg.

2.4 CEILING CIRCULATION FAN

A. Manufacturer: Big Ass Fan or equal.

PART 3 - EXECUTION

3.1 PLACEMENT AND MOUNTING

A. Installation: Fan location shall be as indicated; however, actual placement shall be verified using field measurements and data relating to the equipment approved for actual installation. Mount fan and backdraft damper in strict accordance with manufacturer's instructions.

B. Fan shall be equipped with eight airfoil blades constructed of extruded aluminum. Airfoil restraint system shall be provided for redundant safety between the airfoils and fan hub.

C. Fan motor shall be totally enclosed fan cooled (TEFC) with Class F insulation and capable of continuous operation in 5ºF to 104ºF ambient. Motor shall have variable frequency drive operation.

D. Gearbox: Gear reducer to be helical type with lifetime internal lubrication.

E. Warranty: Manufacturer warranty shall include seven year mechanical components and three year electrical components.

F. Controls: Provide variable speed wall controller with touch screen interface. Controller shall have IP55 rating. Controller shall include pilot relay for shut down upon signal from FACP.

3.2 SOUND AND VIBRATION CONTROL

A. Reference: Refer Section 23 33 00.

1. In-line Fan: Provide inlet and outlet flexible duct connections. Each fan shall be hung using neoprene vibration isolators.

3.3 OPERATING CONTROLS

A. Control Interlock: Interlock the exhaust fans with their associated light switch. Refer to electrical plans.

3.4 TEST AND BALANCE

A. Checkout: Operate all fans, adjust drive speeds to achieve design air flow, and perform other requirements as indicated in Section 23 08 00, PERFORMANCE VERIFICATION.

END OF SECTION 233400

SECTION 233713 – AIR DISTRIBUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Basic Requirements: Provisions of Section 23 05 01, BASIC MECHANICAL REQUIREMENTS are a part of this Section.

1.2 SUMMARY

A. General: Provide air distribution devices as indicated.

1.3 SUBMITTALS

A. General: Refer to paragraph entitled "SUBMITTALS" in Section 23 05 01. Include the following data:

1. Manufacturers Literature:

    a. Photograph or rendering of each device
    b. Cut sheets showing the pressure drop, throw and noise levels at various air flows for each air distribution device.
    c. Color samples factory-applied to the same substrate as the finished product

2. Performance Data: Static and total pressure drop, face velocity, throw and noise level for each of the air distribution devices at the air flows indicated.
3. Installation Instructions: device including copies shipped with each air distribution device.

1.4 APPLICABLE STANDARDS

A. General: All equipment, material, accessories, methods of construction and reinforcement, finish quality, workmanship and installation shall be in compliance Section 23 05 01.

B. Air Diffusion Council (ADC): Laboratories used for testing the air flow performance of devices shall be approved by ADC.

C. ASHRAE: Standard 70-72, Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.

D. NFPA: Standard 90A, Installation of Air Conditioning and Ventilating Systems.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Manufacturer: Refer to Section 23 05 01.

2.2 GENERAL

A. Devices: Provide air distribution devices as indicated. All air distribution devices provided shall be the product of a single manufacturer unless specifically indicated otherwise.

B. Acoustical: Noise produced at each diffuser, register, grille or other air distribution device shall not exceed a noise criteria level of NC 35 based on sound pressure levels in db re 20 micropascals or as scheduled on the plans. Coordinate air distribution devices, sound attenuation measures and equipment provided to insure that the design acoustical constraints are not exceeded by the system, assuming a room absorption of 10 db re 1 pW.

C. Pressure Drop: Pressure drop across any air distribution device shall not exceed 0.10 inches of water gauge total pressure or as scheduled on the plans.

D. Material: All devices shall be constructed of extruded aluminum unless otherwise indicated. Air distribution devices installed in fire rated ceiling, floor/ceiling assembly, or rated wall shall be constructed of steel. Devices installed on hard surfaces (drywall or plaster ceilings or walls) shall have a neoprene gasket along each edge to provide an airtight seal.

E. Finish: Each air distribution device shall have a factory applied baked enamel finish. Devices shall be finished in white unless otherwise indicated.

F. Integral Components: All dampers, blank-off baffles and other companion devices which form an integral part of an air distribution device shall be factory-made.

G. Mounting Screws: Mounting screws which are visible on the face of grilles, diffusers or registers shall be furnished with the device and shall be finished at the factory to match the finish on the device on which they are used.

H. Manufacturer:

1. Titus
2. Price
3. Air Devices

2.3 CEILING AIR DISTRIBUTION

A. Round and Rectangular Devices: Devices indicated to be connected with flexible duct shall have a round neck or shall be provided with a factory supplied rectangle-to-round adapter; diffusers with metal duct connections may have round, square, or rectangular

neck. Supply diffusers shall be furnished with a volume damper and adjustable equalizing grid unless otherwise noted; the volume damper shall be adjustable without removing the core.

1. Lay-in Ceiling Grid: Provide lay-in devices which are specifically manufactured to fit into ceiling module.
2. Surface Mounted; Lay-in Grid Ceiling: Provide air distribution devices with border styles which are compatible with adjacent ceiling systems.
3. Floor Mounted: Provide heavy duty frame/border with 1/4" wide, heel proof slots.

B. Linear Devices: Linear ceiling diffusers shall be constructed of extruded aluminum and shall have factory provided plenums with interior insulation, unless otherwise indicated.

1. Lay-in Ceiling Grid: Provide lay-in linear diffusers which are specifically manufactured to fit into ceiling module. Where multiple slots are required the surface between the slots shall match in color and be on the same plane as the ceiling support grid. Provide mid or outboard slots and center cross notch where indicated. Return air linear diffusers shall be provided without pattern controllers.
2. Surface Mounted: Linear diffusers installed in drywall or plaster ceilings shall be finished in aluminum enamel unless otherwise indicated. Provide linear diffusers with border styles as indicated.
3. Floor Mounted: Provide heavy duty frame/border with 1/4" wide, heel proof slots.

2.4 SIDEWALL AIR DISTRIBUTION

A. Rectangular Devices: Unless otherwise indicated, supply, return and exhaust grilles and registers shall be extruded aluminum construction. All supply device blades shall be individually adjustable. Devices shall have an opposed blade damper, adjustable from the front of the device.

B. Linear Devices: Unless otherwise indicated, sidewall linear supply and return air devices shall be extruded aluminum construction; furnish complete with frame and border as indicated.

PART 3 - EXECUTION

3.1 GENERAL

A. Coordination: Coordinate the location of air distribution devices and reflected ceiling drawings with respect to placement and alignment to prevent conflict with lighting fixtures, fire protection sprinklers and smoke detectors. All rectangular ceiling devices shall be installed with their lines parallel and perpendicular to the building lines and aligned with the ceiling. Surface mounted devices shall be secured to and supported by metal duct branches or drops. Devices shall be supported by separate hangers where flexible duct connections are indicated.

B. Location: Install air distribution devices where indicated and in accordance with manufacturer's recommendations. The location of ceiling supply, return and exhaust air devices as shown on the designer's reflected ceiling drawings shall take precedence over any other location shown.

C. Exposed Duct and Device Interiors: Duct interiors, air distribution device interiors and blank-offs shall be painted with flat black enamel to eliminate light reflectance from the inside of the duct system.

D. Non-ducted Devices: Ceiling mounted devices without duct connections shall be provided with a mounting frame for incorporation into the ceiling system.

E. Support: All ducts connected to air distribution devices shall be supported independently of the ceiling. Verify the ceiling grid type being furnished. Lay-in devices shall be supported from the structure above if the suspended ceiling grid is not designed to carry the weight of the device.

F. Surface Mounted Devices; Lay-In Ceiling: Unless otherwise indicated, locate units in center of acoustical ceiling modules. Install square and parallel with the ceiling grid members and aligned vertically with the ceiling tile. The ceiling tile shall not be used to support any device.

G. Linear Devices: Do not install blank-offs under continuous linear diffuser distribution plenums. Distribution plenums shall cover only active portions of the linear devices and shall be supported independently from the ceiling system. Blank-offs, where required, shall be located between the distribution plenums.

H. Installation: Mount to the duct system flanges using screws provided by the device manufacturer, sealing the device to the duct system to prevent air leakage. Align adjustable blades to provide distribution without draft, pressure drop exceeding indicated value, or noise exceeding indicated values.

3.2 EXPOSED DUCTWORK

A. Diffuser: Duct mounted supply diffusers shall be provided with a collar of sufficient length to have the closed combination damper and equalizing grid, where required, flush with the interior surface of the duct.

B. Sidewall Device: Duct mounted sidewall devices shall be provided with a collar of sufficient depth to allow the open opposed blade damper to be flush with the interior surface of the duct. The length and height of the collar shall be equal to or greater than the exterior border dimension of the device.

3.3 EXPOSED FAN COIL UNITS

A. Supply Device: Unless otherwise indicated, supply air grilles for exposed fan coil units, whether furnished by the fan coil unit manufacturer or not, shall comply with the requirements for sidewall supply air devices, including the setting of blade deflection. The grille shall be sized to match the fan coil discharge opening without any type of adapter.

3.4 INSULATION

A. General: The exterior of all supply devices shall be insulated with a minimum of 3/4 inch elastomeric or 1 inch fiberglass blanket with vapor seal. The external insulation shall overlap any internal insulation a minimum distance of 4 inches. The vapor seal shall extend to the edge of the device. The overlap end shall seal against the duct and the exterior duct insulation vapor seal.

END OF SECTION 233713

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SECTION 238126 – SPLIT SYSTEM HEAT PUMP UNIT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Basic Requirements: Provisions of Section 23 05 01, BASIC MECHANICAL REQUIREMENTS, are a part of this Section.

1.2 SUMMARY

A. General: Provide labor, services, material and related items necessary to complete the installation of packaged air conditioning unit shown on the drawings or specified herein.

1.3 SUBMITTALS

A. General: Include the following data:

1. Manufacturers Literature:

a. Dimensional outline drawing showing the operating weights of the outdoor packaged equipment, all connection locations, and the distribution of the weight to the structure.

2. Performance Data: Sensible and total cooling capacities at the indicated design conditions for all packaged units.
3. Installation Instructions: Manufacturer's printed installation instructions including copies shipped with the equipment.
4. Maintenance Instructions: Manufacturer's printed maintenance instructions for equipment covered in this Section.

1.4 APPLICABLE STANDARDS

A. General: All equipment, material, accessories, methods of construction and reinforcement, finish quality, workmanship and installation shall be in compliance with Section 23 05 01.

B. NFPA: Insulation and adhesive shall meet the flame spread and smoke generation requirements of NFPA-90A.

C. ASHRAE: Packaged units shall be designed to conform to ASHRAE 15.

D. UL and CSA: Units shall be UL Listed and CSA Certified as a total package.

E. ARI: Capacities shall be rated in accordance with ARI Standard 210/240 or ARI Standard 360.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. General: Refer to Section 23 05 01. All products of a similar type shall be provided by the same manufacturer.

B. Acceptable Manufacturers:

1. Trane
2. Carrier Corporation
3. JCI

2.2 HEAT PUMP UNIT

A. General: The packaged equipment shall be specifically manufactured for outdoor applications. Capacity and energy efficiency shall not be less than indicated but no less than 15.0 SEER. The air entering the condenser shall be 115 degrees F. unless otherwise indicated. Each unit shall be factory assembled and factory tested.

B. Cabinet: The cabinet shall be constructed of 16 gauge galvanized steel. Design of the cabinet shall allow access to compressor and all electrical connections. Asphalt or epoxy coating shall prevent water from reaching steel on the interior of the base bottom. Cabinet parts shall be cleaned and coated with zinc-phosphate or another suitable preparation, then painted with a baked enamel finish. All exterior hardware (nuts, bolts, screws, washers) shall be stainless steel.

C. Fans and Motors:

1. Condenser Fans: The condenser air fans shall be steel propeller type, dynamically balanced and direct-driven by a fan motor with pre-lubricated sealed ball bearings and built-in thermal overload protection. The condenser air discharge shall be provided with a vinyl coated or galvanized steel fan guard.

D. Compressors:

1. Type: Hermetic reciprocating or scroll compressor or serviceable semi-hermetic compressor shall have crankcase heater and equipped with internal overheat-overload protection. Semi-hermetic compressor shall be equipped with isolation valves and oil pressure failure protection. Provide reciprocating compressor only if scroll is not available in specified size.
2. Mounting: Compressors shall be provided with neoprene isolators and internal spring mounting on independent dedicated rails for vibration isolation.

E. Coils: The condenser coils shall be aluminum plate-finned formed on multiple rows of seamless copper tubing arranged in a staggered tube configuration and leak-tested to 300 psig. Exterior coil guards shall be galvanized or vinyl coated steel.

F. Refrigerant Components: Refrigerant shall be HFC-410a. Included in the refrigerant circuit shall be a condenser fan cycling head pressure control, accumulator, filter-drier, high pressure safety control (manual-reset), low pressure safety control/loss of charge protector (auto-reset), dual gauge connections for high and low pressure readings, sight glass-moisture indicator, reversing valves, and thermal-expansion valve. The expansion valve shall have adjustable superheat and distributors to meter the refrigerant evenly to the evaporator refrigerant circuits (air handler). Provide Schrader-type valve assembly with threaded cap for both liquid and suction lines to permit field testing and recharging.

G. Unit shall be factory prewired so that only power wiring to a fused disconnect furnished and mounted by the unit manufacturer and interlocking control wiring between a terminal block on the condenser and the indoor unit is required in the field. The internal wiring shall include fused disconnect switches and motor starters required for the air cooled condenser fan motors. An electrical interlock shall be provided to start the condenser fan motor when the compressor starts.

H. Control and Safeties:

1. Internally wired controls shall include the compressor anti-short cycle timer, compressor motor contactors or starters, high pressure cutout. The control circuit shall include a 24 volt transformer and low voltage terminal board.

2.3 AIR HANDLER UNIT

A. Cabinet: The cabinet shall be constructed of 16 gauge galvanized steel. The interior of the cabinet shall be thermally insulated with 3/4 inch thick fiberglass with antimicrobial coating.

B. Fans and Motors:

1. Evaporator Fan: The indoor fan shall be statically and dynamically balanced centrifugal blower and shall be made of galvanized steel. Blower wheel shall be mounted on a solid steel shaft supported by sealed ball bearings or regreasable-type with lubrication lines extended to the outside of the cabinet. Blower motors shall have pre-lubricated sealed ball bearings. The fan assembly shall be completely isolated from vibration.

C. Coils: The evaporator coils shall be aluminum plate-finned formed on multiple rows of seamless copper tubing arranged in a staggered tube configuration and leak-tested to 300 psig.

D. Condensate Drain Pan: The insulated condensate drain pan shall be non-corrosive. Connections shall be provided on both sides of unit and drain pan shall be sloped to drain connection.

E. Electric Heating Coil: Provide a factory-installed nickel-chrome electric heating coil. The coil shall be the open wire type. The installation shall include all internal wiring and branch circuit fusing. The coil shall have one stage of control with airflow cut-out switch and manual-reset high-temperature cut-out.

F. Filter Section: The filter section shall provide for 1-inch thick throwaway type filter installed in filter rack. Filter shall have MERV 7 efficiency. The filter shall be accessible through an insulated and gasketed access door in the side of the unit.

G. Power Wiring: The unit shall be provided with factory-installed branch circuiting for a single point of termination requiring only one field connection for power wiring. Blower fan and electric heating coil shall be individually fused.

H. Controls and Safeties:

1. Control: Cooling/heating shall be controlled by a factory-provided programmable thermostat. Thermostat shall have occupancy schedule, setback, and auto-changeover features. Two stage thermostat shall automatically switch from heat pump mode to electric resistance heating when demand is not met and shall automatically switch back to heat pump operation upon return to setpoint.
2. Blower Operation: Blower operation shall cycle with condensing unit to maintain space temperature setpoint.
3. Firestat: Provide a firestat in the return air to the unit to de-energize the unit when the temperature rises to above 145 degrees F.

PART 3 - EXECUTION

3.1 GENERAL

A. Placement: The equipment location shall be as shown; however, actual placement shall be verified using field measurements and data relating to the equipment accepted for actual installation on the project in order to avoid conflict with the structure and the access to or location of other equipment.

B. Clearance: Layout and carefully install units with sufficient clearances to permit proper maintenance. The space required shall be as recommended by the manufacturer including the space required for removal of the for maintenance.

C. Coordination: Coordinate with ductwork, electrical connections and controls for a neat workmanlike installation.

3.2 WARRANTY

A. Extended Warranty: Each compressor shall be provided with a 5-year extended warranty. The warranty period shall commence upon the date of substantial completion.

END OF SECTION 238126

SECTION 238129 – VARIABLE REFRIGERANT FLOW SYSTEMS

PART 1 - GENERAL

1.1 SYSTEM DESCRIPTION Y-SERIES (HEAT/COOL MODEL)

A. Per the equipment schedule, the variable capacity, heat pump air conditioning system basis of design is Mitsubishi Electric CITY MULTI VRF (Variable Refrigerant Flow) zoning system(s).

B. Acceptable alternative manufacturers, assuming compliance with these equipment specifications, are Daikin, Panasonic, and Hitachi. Contractor bidding an alternate manufacturer does so with full knowledge that that manufactures product may not be acceptable or approved and that contractor is responsible for all specified items and intents of this document without further compensation.

1.2 QUALITY ASSURANCE

A. The units shall be listed by Electrical Testing Laboratories (ETL) and bear the ETL label.

B. All wiring shall be in accordance with the National Electrical Code (N.E.C.).

C. The units shall be manufactured in a facility registered to ISO 9001 and ISO14001 which is a set of standards applying to environmental protection set by the International Standard Organization (ISO).

D. All units must meet or exceed the 2010 Federal minimum efficiency requirements and the ASHRAE 90.1 efficiency requirements for VRF systems. Efficiency shall be published in accordance with the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Standard 1230.

E. System start-up supervision shall be a required service to be completed by the manufacturer or a duly authorized, competent representative that has been factory trained in system configuration and operation. The representative shall provide proof of manufacturer certification indicating successful completion within no more than two (2) years prior to system installation. This certification shall be included as part of the equipment and/or controls submittals.

1.3 DELIVERY, STORAGE AND HANDLING

A. Unit shall be stored and handled according to the manufacturer’s recommendation.

PART 2 - WARRANTY

A. The CITY MULTI units shall be covered by the manufacturer's limited warranty for a period of one (1) year parts and seven (7) year compressor to the original owner from date of installation.

B. Installing contractor shall meet manufacturer requirements to obtain extended manufacturer's limited parts and compressor warranty for a period of ten (10) years to the original owner from date of installation. This warranty shall not include labor.

C. Manufacturer shall have a minimum of fifteen (15) years continuous experience providing VRF systems in the U.S. market.

D. All manufacturer technical and service manuals must be readily available for download by any local contractor should emergency service be required. Registering and sign-in requirements which may delay emergency service reference are not allowed.

E. The CITY MULTI VRF system shall be installed by a contractor with extensive CITY MULTI install and service training. The mandatory contractor service and install training should be performed by the manufacturer.

PART 3 - OUTDOOR UNITS

3.1 Y-SERIES HIGH EFFICIENCY (HEAT PUMP), AIR-COOLED Outdoor UNITS

A. General:

1. The outdoor unit modules shall be air-cooled, direct expansion (DX), multi-zone units used specifically with VRF components described in this section and Part 5 (Controls). The outdoor unit modules shall be equipped with a single compressor which is inverter-driven and multiple circuit boards—all of which must be manufactured by the branded VRF manufacturer. Each outdoor unit module shall be completely factory assembled, piped and wired and run tested at the factory.

2. Outdoor unit systems may be comprised of multiple modules with differing capacity if a brand other than basis of design is proposed. All units requiring a factory supplied twinning kits shall be piped together in the field, without the need for equalizing line(s). If an alternate manufacturer is selected, any additional material, cost, and labor to install additional lines shall be incurred by the contractor. Contractor responsible for ensuring alternative brand compatibility in terms of availability, physical dimensions, weight, electrical requirements, etc.

3. Outdoor unit shall have a sound rating no higher than 64.5 dB(A) individually or 69.5 dB(A) twinned. Units shall have a sound rating no higher than 52 dB(A) individually or 54.5 dB(A) twinned while in night mode operation. Units shall have 5 levels sound adjustment via dip switch selectable fan speed settings. If an alternate manufacturer is selected, any additional material, cost, and labor to meet published sound levels shall be incurred by the contractor.

4. Refrigerant lines from the outdoor unit to the indoor units shall be insulated in accordance with the installation manual.

5. The outdoor unit shall have the capability of installing the main refrigerant piping through the bottom of the unit.

6. The outdoor unit shall have an accumulator with refrigerant level sensors and controls. Units shall actively control liquid level in the accumulator via Linear Expansion Valves (LEV) from the heat exchanger.

7. The outdoor unit shall have a high pressure safety switch, over-current protection, crankcase heater and DC bus protection.

8. VRF system shall meet performance requirements per schedule and be within piping limitations & acceptable ambient temperature ranges as described in respective manufacturers' published product catalogs. Non-published product capabilities or performance data are not acceptable.

9. The outdoor unit shall be capable of guaranteed operation in heating mode down to -25F ambient temperatures and cooling mode up to 126°F without additional restrictions on line length & vertical separation beyond those published in respective product catalogs. Models with capacity data for required temperature range published as "for reference only" are not considered capable of guaranteed operation and are not acceptable. If an alternate manufacturer is selected, any additional material, cost, and labor to meet ambient operating range and performance shall be incurred by the contractor.

10. The outdoor unit shall have a high efficiency oil separator plus additional logic controls to ensure adequate oil volume in the compressor is maintained. Oil return sequences must be enabled only during extended periods of reduced refrigerant flow to ensure no disruption to correct refrigerant flow to individual zones during peak loads. Systems which might engage oil return sequence based on hours of operation risk oil return during inopportune periods are not allowed. Systems which rely on sensors (which may fail) to engage oil return sequence are not allowed.

11. Unit must defrost all circuits simultaneously in order to resume full heating more quickly during extreme low ambient temperatures (below 23F). Partial defrost, also known as hot gas defrost which allows reduced heating output during defrost, is permissible only when ambient temperature is above 23F.

12. While in hot gas defrost the system shall slow the indoor unit fan speed down to maintain a high discharge air temperature, systems that keep fan running in same state shall not be allowed as they provide an uncomfortable draft to the indoor zone due to lower discharge air temperatures.

B. Unit Cabinet:

1. The casing(s) shall be fabricated of galvanized steel, bonderized and finished.

2. The outdoor unit shall be tested in compliance with ISO9277 such that no unusual rust shall develop after 960 hours of salt spray testing.

3. Panels on the outdoor unit shall be scratch free at system startup. If a scratch occurs the salt spray protection is compromised and the panel should be replaced immediately.

C. Fan:

1. Each outdoor unit module shall be furnished with direct drive, variable speed propeller type fan(s) only. Fans shall be factory set for operation at 0 in. WG external static pressure, but capable of normal operation with a maximum of 0.32 in. WG external static pressure via dipswitch.

2. All fan motors shall have inherent protection, have permanently lubricated bearings, and be completely variable speed.

3. All fans shall be provided with a raised guard to prevent contact with moving parts.

D. Refrigerant and Refrigerant Piping

1. R410A refrigerant shall be required for systems.

2. Polyolester (POE) oil—widely available and used in conventional domestic systems—shall be required. Prior to bidding, manufacturers using alternate oil types shall submit material safety data sheets (MSDS) and comparison of hygroscopic properties for alternate oil with list of local suppliers stocking alternate oil for approval at least two weeks prior to bidding.

3. Refrigerant piping shall be phosphorus deoxidized copper (copper and copper alloy seamless pipes) of sufficient radial thickness as defined by the VRF equipment manufacturer and installed in accordance with manufacturer recommendations.

4. All refrigerant piping must be insulated with ½” closed cell, CFC-free foam insulation with flame-Spread Index of less than 25 and a smoke-development Index of less than 50 as tested by ASTM E 84 and CAN / ULC S-102. R value of insulation must be at least 3.

5. Refrigerant line sizing shall be in accordance with manufacturer specifications.

E. Coil:

1. Outdoor Coil shall be constructed to provide equal airflow to all coil face surface are by means of a 4-sided coil.

2. Outdoor Coil shall be elevated at least 12” from the base on the unit to protect coil from freezing and snow build up in cold climates. Manufacturer’s in which their coil extends to within a few inches from the bottom of their cabinet frame shall provide an additional 12” of height to their stand or support structure to provide equal protection from elements as Mitsubishi Electric basis of design. Any additional support costs, equipment fencing, and tie downs required to meet this additional height shall be responsibility of Mechanical Contractor to provide.

3. The outdoor heat exchanger shall be of zinc coated aluminum construction with turbulating flat tube construction. The coil fins shall have a factory applied corrosion resistant finish. Uncoated aluminum coils/fins are not allowed.

4. The coil shall be protected with an integral metal guard.

5. Refrigerant flow from the outdoor unit shall be controlled by means of an inverter driven compressor.

6. Unit shall have prewired plugs for optional panel heaters when operating below ambient conditions of 1F to prevent any residual ice buildup from defrost.

7. Condenser coil shall have active hot gas circuit direct from compressor discharge on lowest coil face area to shed defrost condensate away from coil and protect from Ice formation after returning to standard heat pump operation. While in Heat Pump operation this lower section of the Outdoor Evaporator coil shall continually run hot gas from the compressor discharge to protect the coil from ice buildup and coil rupture. Manufacturers who do not have an active hot gas circuit in the lower section of the Outdoor coil to protect coil from freezing shall not be allowed to bid on project in markets where the outdoor unit will see temperatures below freezing.

F. Compressor:

1. Each outdoor unit module shall be equipped with only inverter driven scroll hermetic compressors. Non inverter-driven compressors, which may cause inrush current (demand charges) and require larger generators for temporary power shall not be allowed.

2. Each compressor shall be equipped with a multi-port discharge mechanism to eliminate over compression at part load. Manufacturer’s that rely on a single compressor discharge port and provide no means of eliminating over compression and energy waste at part load shall not be allowed.

3. Crankcase heat shall be provided via induction-type heater utilizing eddy currents from motor windings. Energy-wasting “belly-band” type crankcase heaters are not allowed. Manufacturers that utilize belly-band crankcase heaters will be considered as alternate only.

4. Compressor shall have an inverter to modulate capacity. The capacity for each compressor shall be variable with a minimum turndown not greater than 15%.

5. The compressor shall be equipped with an internal thermal overload.

6. Field-installed oil equalization lines between modules are not allowed. Prior to bidding, manufacturers requiring equalization must submit oil line sizing calculations specific to each system and module placement for this project.

7. Manufacturers that utilize a compressor sump oil sensor to equalize compressor oil volume within a single module shall not be allowed unless they actively shut down the system to protect from compressor failure.

G. Controls:

1. The unit shall be an integral part of the system & control network described in Part 5 (Controls) and react to heating/cooling demand as communicated from connected indoor e control circuit. Required field-installed control voltage transformers and/or signal boosters shall be provided by the manufacturer.

2. The outdoor unit shall have the capability of 4 levels of demand control for each refrigerant system based on external input.

H. Electrical:

1. The outdoor unit electrical power shall be 208/230 volts, 3-phase, 60 hertz or 460 volts, 3-phase, 60 hertz per equipment schedule.

2. The outdoor unit shall be controlled by integral microprocessors.

3. The control circuit between the indoor units and the outdoor unit shall be 24VDC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.

PART 4 - INDOOR UNITS

4.1 4-WAY CEILING-RECESSED CASSETTE WITH GRILLE INDOOR UNIT

A. General:

1. The ceiling-recessed indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation function, a test run switch, and the ability to adjust airflow patterns for different ceiling heights. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory. The unit shall be suitable for use in plenums in accordance with UL1995 ed 4.

B. Unit Cabinet:

1. The cabinet panel shall have provisions for a field installed filtered outside air intake.

2. Branch ducting shall be allowed from cabinet.

3. Four-way grille shall be fixed to bottom of cabinet allowing two, three or four-way blow.

4. The grille vane angles shall be individually adjustable from a wired remote controller to customize the airflow pattern for the conditioned space

C. Fan:

1. The indoor fan shall be an assembly with a statically and dynamically balanced turbo fan direct driven by a single motor with permanently lubricated bearings.

2. The indoor unit shall include an AUTO fan setting capable of maximizing energy efficiency by adjusting the fan speed based on the difference between controller set-point and space temperature. The indoor fan shall be capable of five (5) speed settings, Low, Mid1, Mid2, High and Auto.

3. The indoor unit shall have an adjustable air outlet system offering 4-way airflow, 3-way airflow, or 2-way airflow.

4. The indoor unit fan logic must include multiple setting that can be changed to provide optimum airflow based on ceiling height and number of outlets used.

5. The indoor unit vanes shall have 5 fixed positions and a swing feature that shall be capable of automatically swinging the vanes up and down for uniform air distribution.

6. The vanes shall have an Auto-Wave selectable option in the heating mode that shall randomly cycle the vanes up and down to evenly heat the space.

7. Grille shall include a factory-installed “i-see” sensor, or equal, to work in conjunction with indoor unit control sequence to prevent unnecessary cooling or heating in unoccupied areas of the zone without decreasing comfort levels. Sensor must detect occupancy (not simply motion) and location of occupants by measuring size & temperature of objects within a 39’ detecting diameter (based on 8.8ft mounting height) with 1,856 or more measuring points.

D. Filter:

1. Return air shall be filtered by means of a long-life washable filter

E. Coil:

1. The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phos-copper or silver alloy.

2. The coils shall be pressure tested at the factory.

3. The unit shall be provided with an integral condensate lift mechanism that will be able to raise drain water 33 inches above the condensate pan.

F. Electrical:

1. The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.

2. The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz).

G. Controls:

1. Indoor unit shall compensate for the higher temperature sensed by the return air sensor compared to the temperature at level of the occupant when in HEAT mode. Disabling of compensation shall be possible for individual units to accommodate instances when compensation is not required.

2. Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8°F – 9.0°F adjustable deadband from set point.

3. Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies.

4. Indoor unit shall include no less than three (3) digital outputs capable of being used for customizable control strategies.

5. A factory-installed drain pan sensor shall provide protection against drain pan overflow by sensing a high condensate level in the drain pan. Should this occur the control shuts down the indoor unit before an overflow can occur. A thermistor error code will be produced should the sensor activate indicating a fault which must be resolved before the unit re-starts.

4.2 4-WAY CEILING-RECESSED CASSETTE WITH GRILLE FOR 2X2 GRID INDOOR UNIT

A. General:

1. The indoor unit shall be a four-way cassette style indoor unit that recesses into the ceiling with a ceiling grille. The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation function and a test run switch. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory. The unit shall be suitable for use in plenums in accordance with UL1995 ed 4.

B. Unit Cabinet:

1. The cabinet shall be a compact 22-7/16” wide x 22-7/16” deep so it will fit within a standard 24” square suspended ceiling grid.

2. The cabinet panel shall have provisions for a field installed filtered outside air intake.

3. Four-way grille shall be fixed to bottom of cabinet allowing two, three or four-way blow.

C. Fan:

1. The indoor fan shall be an assembly with a turbo fan direct driven by a single motor.

2. The indoor fan shall be statically and dynamically balanced to run on a motor with permanently lubricated bearings.

3. The indoor unit shall include an AUTO fan setting capable of maximizing energy efficiency by adjusting the fan speed based on the difference between controller set-point and space temperature. The indoor fan shall be capable of five (4) speed settings, Low, Mid, High and Auto.

4. The indoor unit shall have an adjustable air outlet system offering 4-way airflow, 3-way airflow, or 2-way airflow.

5. The indoor unit vanes shall have 5 fixed positions and a swing feature that shall be capable of automatically swinging the vanes up and down for uniform air distribution.

6. Grille shall include a factory-installed “i-see” sensor, or equal, to work in conjunction with indoor unit control sequence to prevent unnecessary cooling or heating in unoccupied areas of the zone without decreasing comfort levels. Sensor must detect occupancy (not simply motion) and location of occupants by measuring size & temperature of objects within a 39’ detecting diameter (based on 8.8ft mounting height) with 1,856 or more measuring points.

D. Filter:

1. Return air shall be filtered by means of a long-life washable filter.

E. Coil:

1. The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phos-copper or silver alloy.

2. The coils shall be pressure tested at the factory.

3. The unit shall be provided with an integral condensate lift mechanism that will be able to raise drain water 19-3/4” inches above the condensate pan.

F. Electrical:

1. The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.

2. The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz).

G. Controls:

1. Indoor unit shall compensate for the higher temperature sensed by the return air sensor compared to the temperature at level of the occupant when in HEAT mode. Disabling of compensation shall be possible for individual units to accommodate instances when compensation is not required.

2. Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8°F – 9.0°F adjustable deadband from set point.

3. Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies.

4. Indoor unit shall include no less than three (3) digital outputs capable of being used for customizable control strategies.

5. A factory-installed drain pan sensor shall provide protection against drain pan overflow by sensing a high condensate level in the drain pan. Should this occur, the control shuts down the indoor unit before an overflow can occur. A thermistor error code will be produced should the sensor activate indicating a fault which must be resolved before the unit re-starts.

4.3 MEDIUM STATIC CEILING-CONCEALED DUCTED INDOOR UNIT

A. General:

1. The ceiling-concealed ducted indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, and an auto restart function. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory. The unit shall be suitable for use in plenums in accordance with UL1995 ed 4.

B. Unit Cabinet:

1. The unit shall be ceiling-concealed, ducted—with a 2-position, field adjustable return and a fixed horizontal discharge supply.

2. The cabinet panel shall have provisions for a field installed filtered outside air intake.

C. Fan:

1. Indoor unit shall feature multiple external static pressure settings ranging from 0.14 to 0.60 in. WG.

2. The indoor unit fan shall be an assembly with statically and dynamically balanced Sirocco fan(s) direct driven by a single motor with permanently lubricated bearings.

3. The indoor fan shall consist of three (3) speeds, High, Mid, and Low plus the Auto-Fan function

D. Filter:

1. Return air shall be filtered by means of a standard factory installed return air filter.

2. Optional return filter box (rear or bottom placement) with high-efficiency filter as noted on equipment schedule.

E. Optional Filter Frame and Filter:

1. Filter frame shall be constructed of 20 gauge G-60 galvanized steel. Knurled thumb screws on access door allow filter replacement. Foam gasket provides air-tight connection to indoor unit and access door. Filter frame shall be configurable for rear or bottom return.

2. Filter shall be rated MERV 13 when tested in accordance with ANSI/ASHRAE 52.2 Standard Rated Class 2 under U.L. Standard 900.

F. Coil:

1. The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phos-copper or silver alloy.

2. The coils shall be pressure tested at the factory.

3. Coil shall be provided with a sloped drain pan. Units without sloped drain pans which must be installed cockeyed to ensure proper drainage are not allowed.

4. The unit shall be provided with an integral condensate lift mechanism able to raise drain water 27 inches above the condensate pan.

G. Electrical:

1. The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.

2. The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz).

H. Controls:

1. Indoor unit shall compensate for the higher temperature sensed by the return air sensor compared to the temperature at level of the occupant when in HEAT mode. Disabling of compensation shall be possible for individual units to accommodate instances when compensation is not required.

2. Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8°F – 9.0°F adjustable deadband from set point.

3. Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies.

4. Indoor unit shall include no less than three (3) digital outputs capable of being used for customizable control strategies.

4.4 HIGH STATIC, CEILING-CONCEALED DUCTED INDOOR UNIT

A. General:

1. The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, and an auto restart function. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory. The unit shall be suitable for use in plenums in accordance with UL1995 ed 4.

B. Unit Cabinet:

1. The cabinet shall be ceiling-concealed, ducted with a fixed rear return and a horizontal discharge supply.

2. The cabinet panel shall have provisions for a field installed filtered outside air intake.

C. Fan:

1. Indoor unit shall feature adjustable external static pressure settings up to 1.00 in. WG.

2. The indoor unit fan shall be an assembly with one or two statically and dynamically balanced Sirocco fan(s) direct driven by a single motor with permanently lubricated bearings.

D. Filter:

1. Return air shall be filtered by a field-supplied filter.

E. Coil:

1. The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phos-copper or silver alloy.

2. The coils shall be pressure tested at the factory.

3. Coil shall be provided with a sloped drain pan. Units without sloped drain pans which must be installed cockeyed to ensure proper drainage are not allowed.

F. Electrical:

1. The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.

2. The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz).

G. Controls:

1. Indoor unit shall compensate for the higher temperature sensed by the return air sensor compared to the temperature at level of the occupant when in HEAT mode. Disabling of compensation shall be possible for individual units to accommodate instances when compensation is not required.

2. Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8°F – 9.0°F adjustable deadband from set point.

3. Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies.

4. Indoor unit shall include no less than three (3) digital outputs capable of being used for customizable control strategies.

4.5 VERTICAL/HORIZONTAL DUCTED (MULTI-POSITION AIR HANDLER)

A. General:

1. The multi-position indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, and an auto restart function. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory. The unit shall be suitable for use in air handling spaces in accordance with Section 18.2 of UL 1995 4th Edition, be tested in accordance with ANSI/ASHRAE 193 and have less than 2% air leakage at maximum airflow setting.

B. Unit Cabinet:

1. The cabinet shall include a fixed bottom return, a fixed vertical discharge supply and be pre-painted, pre-insulated, 22 gauge galvanized steel.

C. Fan:

1. The indoor unit fan shall be an assembly with a single, statically and dynamically balanced direct drive fan with a high efficiency DC motor with permanently lubricated bearings.

2. The fan shall have 3-speeds with the capability to operate between 0.3-0.8 In.WG selectable.

D. Filter:

1. The unit shall have a 1” filter rack with a reusable filter.

E. Coil:

1. The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phos-copper or silver alloy.

2. The coils shall be pressure tested at the factory.

F. Electrical:

1. The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.

2. The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz).

G. Controls:

1. Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8 degree F deadband from set point.

PART 5 - CONTROLS

5.1 OVERVIEW

A. The control system shall consist of a low voltage communication network and a web-based interface. The controls system shall gather data and generate web pages accessible through a conventional web browser on each PC connected to the network. Operators shall be able to perform all normal operator functions through the web browser interface.

B. Furnish energy conservation features such as optimal start, request-based logic, and demand level adjustment of overall system capacity as specified in the sequence.

C. System shall be capable of email generation for remote alarm annunciation.

5.2 ELECTRICAL CHARACTERISTICS

A. General:

1. Controller power and communications shall be via a common non-polar communications bus and shall operate at 30VDC.

B. Wiring:

1. Control wiring shall be installed in a daisy chain configuration from indoor unit to indoor unit, to the BC controller (main and subs, if applicable) and to the outdoor unit. Control wiring to remote controllers shall be run from the indoor unit terminal block to the controller associated with that unit.

2. Control wiring for centralized controllers shall be installed in a daisy chain configuration from outdoor unit to outdoor unit, to the system controllers (centralized controllers and/or integrated web based interface), to the power supply.

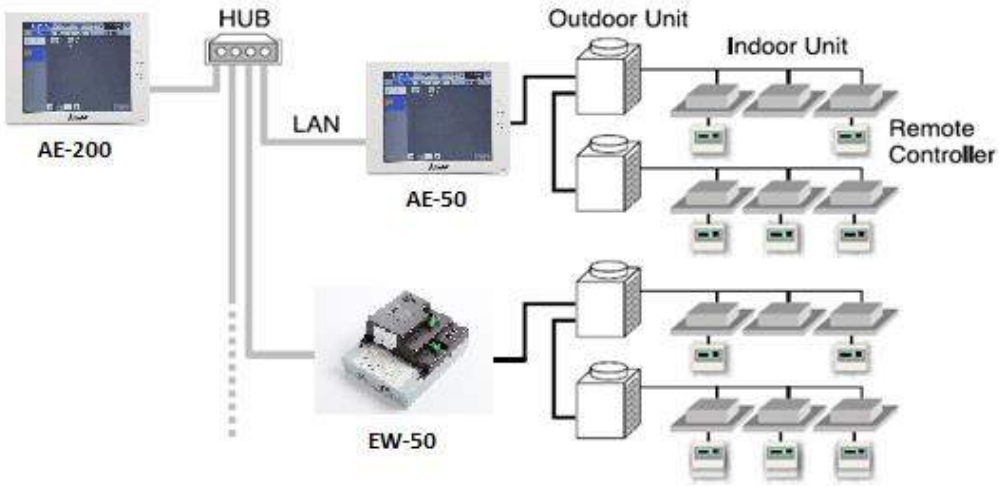
C. Wiring type:

1. Wiring shall be 2-conductor (16 AWG), twisted, stranded, shielded wire as defined by the Diamond System Builder output.

2. Network wiring shall be CAT-5 with RJ-45 connection.

5.3 CITY MULTI CONTROLS NETWORK

A. The CITY MULTI Controls Network (CMCN) consists of remote controllers, centralized controllers, and/or integrated web based interface communicating over a high-speed communication bus. The CITY MULTI Controls Network shall support operation monitoring, scheduling, occupancy, error email distribution, personal web browsers, tenant billing, online maintenance support, and integration with Building Management Systems (BMS) using either LonWorks® or BACnet® interfaces. The below figure illustrates a sample CMCN System Configuration.



CMCN System Configuration

5.4 CENTRALIZED CONTROLLER (WEB-ENABLED)

A. AE-200 Centralized Controller:

1. The AE-200A Centralized Controller shall be capable of controlling a maximum of two hundred (200) indoor units across multiple CITY MULTI outdoor units with the use of three (3) AE-50A expansion controllers. The AE-200A Centralized Controller shall be approximately 11-5/32” x 7-55/64” x 2-17/32” in size and shall be powered with an integrated 100-240 VAC power supply. The AE-200A Centralized Controller shall support system configuration, daily/weekly scheduling, monitoring of operation status, night setback settings, free contact interlock configuration and malfunction monitoring. When being used alone without the expansion controllers, the AE-200A Centralized Controller shall have five basic operation controls which can be applied to an individual indoor unit, a collection of indoor units (up to 50 indoor units), or all indoor units (collective batch operation). This basic set of operation controls for the AE-200 Centralized Controller shall include on/off, operation mode selection (cool, heat, auto (R2/WR2-Series only), dry, setback (R2/WR2-Series only) and fan), temperature setting, fan speed setting, and airflow direction setting. Since the AE-200A provides centralized control it shall be able to enable or disable operation of local remote controllers. In terms of scheduling, the AE-200A Centralized Controller shall allow the user to define both daily and weekly schedules (up to 24 scheduled events per day) with operations consisting of ON/OFF, mode selection, temperature setting, air flow (vane) direction, fan speed, and permit/prohibit of remote controllers.

AE-200 (Centralized Controller)			
Item	**Description**	**Operation**	**Display**
ON/OFF	Run and stop operation.	Each Block, Group or Collective	Each Group or Collective
Operation Mode	Switches between Cool/Dry/Auto/Fan/Heat. (Group of Lossnay unit: automatic ventilation/vent-heat/interchange/normal ventilation) Operation modes vary depending on the air conditioner unit. Auto mode is available for the R2/WR2-Series only.	Each Block, Group or Collective	Each Group
Temperature Setting	Sets the temperature from 57°F – 87°F depending on operation mode and indoor unit.	Each Block, Group or Collective	Each Group
Fan Speed Setting	Available fan speed settings depending on indoor unit.	Each Block, Group or Collective	Each Group
Air Flow Direction Setting	Air flow direction settings vary depending on the indoor unit model. *1. Louver cannot be set.	*1 Each Block, Group or Collective	Each Group

Schedule Operation	Annual/weekly/today schedule can be set for each group of air conditioning units. Optimized start setting is also available. The system follows either the current day, annual schedule, or weekly, which are in the descending order of overriding priority. Twenty-four events can scheduled per day, including ON/OFF, Mode, Temperature Setting, Air Direction, Fan Speed and Operation Prohibition. Five types of weekly schedule (seasonal) can be set. Settable items depend on the functions that a given air conditioning unit supports.	*2 Each Block, Group or Collective	Each Group
Optimized Start	Unit starts 5 - 60 minutes before the scheduled time based on the operation data history in order to reach the scheduled temperature at the scheduled time.	Each Block, Group or Collective	Each Block, Group or Collective
Night Setback Setting	The function helps keep the indoor temperature in the temperature range while the units are stopped and during the time this function is effective.	Each Group	Each Group
Permit / Prohibit Local Operation	Individually prohibit operation of each local remote control function (Start/Stop, Change operation mode, Set temperature, Reset filter). Centrally Controlled is displayed on the remote controller for prohibited functions.	Each Block, Group or Collective	*3 Each Group
Room Temp	Displays the room temperature of the group. Space temperature displayed on the indoor unit icon on the touch screen interface.	N/A	Each Group
Error	When an error is currently occurring on an air conditioner unit, the afflicted unit and the error code are displayed When an error occurs, the LED flashes. The operation monitor screen shows the abnormal unit by flashing it. The error monitor screen shows the abnormal unit address, error code and source of detection. The error log monitor screen shows the time and date, the abnormal unit address, error code and source of detection	N/A	*4 Each Unit or Collective
Outdoor Unit Status	Compressor capacity percentage and system pressure (high and low) pressure (excludes S-Series)	Each ODU	Each ODU
Connected Unit Information	MNET addresses of all connected systems	Each IDU, ODU and BC	Each IDU, ODU and BC
Ventilation Equipment	This interlocked system settings can be performed by the master system controller. When setting the interlocked system, use the ventilation switch the free plan LOSSNAY settings between “Hi”, “Low” and “Stop”. When setting a group of only free plan LOSSNAY units, you can switch between “Normal ventilation”, “Interchange ventilation” and “Automatic ventilation”.	Each Group	Each Group

Multiple Language	Other than English, the following language can be chosen. Spanish, French, Japanese, Dutch, Italian, Russian, Chinese, and Portuguese are available.	N/A	Collective
External Input / Output	By using accessory cables, you can set and monitor the following. Input By level: “Batch start/stop”, “Batch emergency stop” By pulse: “batch start/stop”, “Enable/disable remote controller” Output: “start/stop”, “error/Normal” Requires the external I/O cables (PAC-YG10HA-E) sold separately.	*5 Collective	*5 Collective

2. All AE-200A Centralized Controllers shall be equipped with two RJ-45 Ethernet ports to support interconnection with a network PC via a closed/direct Local Area Network (LAN) or to a network switch for IP communication to up to three AE-50A expansion controllers for display of up to two hundred (200) indoor units on the main AE-200A interface.

3. The AE-200A Centralized Controller shall be capable of performing initial settings via the high-resolution, backlit, color touch panel on the controller or via a PC browser using the initial settings.

4. Standard software functions shall be available so that the building manager can securely log into each AE-200A via the PC’s web browser to support operation monitoring, scheduling, error email, interlocking and online maintenance diagnostics. Additional optional software functions of personal browser for PCs and MACs and Energy shall be available but are not included. The Energy Apportionment function shall require TG-2000 Integrated System software in conjunction with the Centralized Controllers.

B. AE-50A Expansion Controller:

1. The AE-50A Expansion Controller shall serve as a standalone centralized controller or as an expansion module to the AE-200A Centralized Controller for the purpose of adding up to 50 indoor units to either the main touch screen interface of the AE-200A. Up to three (3) AE-50A expansion controllers can be connected to the AE-200A via a local IP network (and their IP addresses assigned on the AE-200A) to the AE-200A to allow for up to two hundred (200) indoor units to be monitored and controlled from the AE-200A interface.

2. The AE-50A expansion controllers have all of the same capabilities to monitor and control their associated indoor units as the features specified above. Even when connected to the AE-200A and configured to display their units on the main controller, the individual indoor units connected to the AE-50A can still be monitored and controlled from the interface of the AE-50. The last command entered will take precedence, whether at the wall controller, the AE-50A or the AE-200A Centralized Controller.

C. EW-50GU Centralized Controller:

1. The EW-50 Centralized Controller shall be capable of controlling a maximum of 50 indoor units across multiple CITY MULTI outdoor units. The EW-50 Centralized Controller shall be approximately 8-1/2”x10” in size and shall be powered from the external power supply (PAC-SC51KUA). The EW-50 Centralized Controller shall support system configuration, daily/weekly scheduling, monitoring of operation status, free contact interlock configuration and malfunction monitoring. The EW-50 Centralized Controller shall have five basic operation controls which can be applied to an individual indoor unit, a group of indoor units (up to 50 indoor units), or all indoor units (collective batch operation). This basic set of operation controls for the EW-50 Centralized Controller shall include on/off, operation mode selection (cool, heat, auto (R2/WR2-Series only), dry, temperature setting, fan speed setting, and airflow direction setting. Since the EW-50 provides centralized control it shall be able to enable or disable operation of local remote controllers. In terms of scheduling, the EW-50 Centralized Controller shall allow the user to define both daily and weekly schedules with operations consisting of ON/OFF, mode selection, temperature setting, air flow (vane) direction, fan speed, and permit/prohibit of remote controllers.

EW-50 (Centralized Controller)			
Item	**Description**	**Operation**	**Display**
ON/OFF	Run and stop operation.	Each Block, Group or Collective	Each Group or Collective
Operation Mode	Indoor unit modes: COOL/DRY/FAN/AUTO/HEAT. Lossnay unit modes: HEAT RECOVERY/BYPASS/AUTO Air to water (PWFY) modes: HEATING/HEATING ECO/HOT WATER/ANTI-FREEZE/COOLING *Operation modes vary depending on the unit model connected. ** Auto mode is available for the R2/WR2-Series only.	Each Block, Group or Collective	Each Group
Temperature Setting	Sets the temperature from 40°F – 95°F depending on operation mode and indoor unit model. Separate COOL and HEAT mode set points available depending on remote controller and connected mechanical equipment.	Each Block, Group or Collective	Each Group
Set Temperature Range Limit	The range of room temperature setting can be limited by the initial setting depending on the indoor unit connected.	Each Group	Each Group
Fan Speed Setting	Available fan speed settings depend on indoor unit model.	Each Block, Group or Collective	Each Group

Air Flow Direction Setting	*Air flow direction settings vary depending on the indoor unit model. Louver cannot be set.	*1 Each Block, Group or Collective	Each Group
Schedule Operation	Annual/weekly/today schedule can be set for each group of air conditioning units. Optimized start setting is also available. *2. The system follows either the current day, annual schedule, or weekly, which are in the descending order of overriding priority. Twenty-four events can scheduled per day, including ON/OFF, Mode, Temperature Setting, Air Direction, Fan Speed and Operation Prohibition. Five types of weekly schedule (seasonal) can be set. Settable items depend on the functions that a given air conditioning unit supports.	*2 Each Block, Group or Collective	Each Group
Hold	Disables scheduled functions for indoor unit groups and their associated remote controller timers. *not available for general equipment	Each Block, Group or Collective	Each Group
Optimized Start	Unit starts 5 - 60 minutes before the scheduled time based on the operation data history in order to reach the scheduled temperature at the scheduled time.	Each Block, Group or Collective	Each Block, Group or Collective
Permit / Prohibit Local Operation	Individually prohibit operation of each local remote control function (Start/Stop, Change operation mode, Set temperature, Fan Speed, Air Direction and Reset filter). Centrally Controlled is displayed on the remote controller for prohibited functions.	Each Block, Group or Collective	*3 Each Group
Room Temp	Displays the room temperature of the group.	N/A	Each Group
Room Humidity	Displays the percent relative humidity in the space as sensed by the Smart ME Remote Controller	N/A	Each Group
Occupancy Sensor	Displays the occupancy icon on the group icon in the condition list page when the room is occupied (blue) or vacant (gray). *The Smart ME Remote Controller Occupancy sensor is required.	N/A	Each Group
Brightness Sensor	Displays the brightness icon on the group icon in the condition list when the space is determined to be bright (yellow) or dark (gray). *The Smart ME Remote Controller Brightness sensor is required.	N/A	Each Group
Error	When an error is currently occurring on an air conditioner unit, the afflicted unit and the error code are displayed	N/A	*4 Each Unit

	When an error occurs, the LED flashes. The operation monitor screen shows the abnormal unit by flashing it. The error monitor screen shows the abnormal unit address, error code and source of detection. The error log monitor screen shows the time and date, the abnormal unit address, error code and source of detection		or Collective
Ventilation Equipment	This interlocked system settings can be performed by the master system controller. When setting the interlocked system, use the ventilation switch the free plan LOSSNAY settings between “Hi”, “Low” and “Stop”. When setting a group of only free plan LOSSNAY units, you can switch between “Normal ventilation”, “Interchange ventilation” and “Automatic ventilation”.	Each Group	Each Group
Multiple Language	Other than English, the following language can be chosen. Spanish, French, Japanese, German, Italian, Russian, Chinese, and Portuguese are available.	N/A	N/A
External Input / Output	By using accessory cables you can set and monitor the following. Input: By level: “Batch start/stop”, “Batch emergency stop”; By pulse: “batch start/stop”, “Enable/disable remote controller” Output: “start/stop”, “error/Normal” Requires the external I/O cables (PAC-YG10HA-E) sold separately.	*5 Collective	*5 Collective
M-Net	The "M-NET" LED lights, when AC power supply is turned ON. The LED blinks while M-NET is communicating.	N/A	Each Group (LED)
Collective ON/OFF	All the units can be operated / stopped with a DIP switch.	Collective	N/A
Measurement	Displays the Temperature and Humidity inputs of the AI Board. Supports graph display and data export.	N/A	Each Unit
AHC Status	Displays the status of the of the inputs and outputs of each Advanced HVAC Controller (DC-A2IO)	N/A	Each Unit
Free Contact Status	Displays the input/output status of the Free Contacts on the indoor units	N/A	Each Unit
Free Contact Interlock Control	Operation of indoor groups, general equipment or free contact outputs based on group(s) conditions or free contact(s) input states.	Each Group, Output or Collective	N/A
Data Back-up (PC)	Initial setting data can be exported to a PC.	Collective	N/A

2. All EW-50 Centralized Controllers shall be equipped with two RJ-45 Ethernet port to support interconnection with a network PC and BACnet/IP communication via a

closed/direct Local Area Network (LAN). The EW-50 Centralized Controller shall be capable of performing initial settings online via a PC using the EW-50 Centralized Controller's initial setting browser or online/offline with the Initial Setting Tool.

3. Standard software functions shall be available so that the building manager can securely log into each EW-50 via the PC's web browser to support operation monitoring, scheduling, error email, interlocking and online maintenance diagnostics. Standard software functions shall not expire. Additional optional software functions of personal browser for PCs and MACs and Energy Allocation shall be available. The Energy Allocation function shall require AE-200 Energy Allocation Integrated System in conjunction with EW-50 Centralized Controllers.

5.5 CMCN REMOTE CONTROLLERS: SYSTEM INTEGRATION

A. The CMCN shall be capable of supporting integration with Building Management Systems (BMS).

B. BAC-HD150: BACnet® Interface:

1. The Mitsubishi Electric Cooling & Heating BACnet® interface, BAC-HD150, shall be compliant with BACnet® Protocol (ANSI/ASHRAE 135-2004) and be Certified by the (BTL) BACnet® Testing Laboratories. The BACnet® interface shall support BACnet Broadcast Management (BBMD). The BACnet® interface shall support a maximum of 50 indoor units. Operation and monitoring points include, but are not limited to, on/off, operation mode, fan speed, prohibit remote controller, filter sign reset, alarm state, error code, and error address.

2. Licenses:

- SW-BACnet Master: Master Controller license for AE-200A and EW-50A
- SW-BACnet Expansion: Expansion Controller license for AE-50A and EW-50A

3. SW-BACnet Specifications:

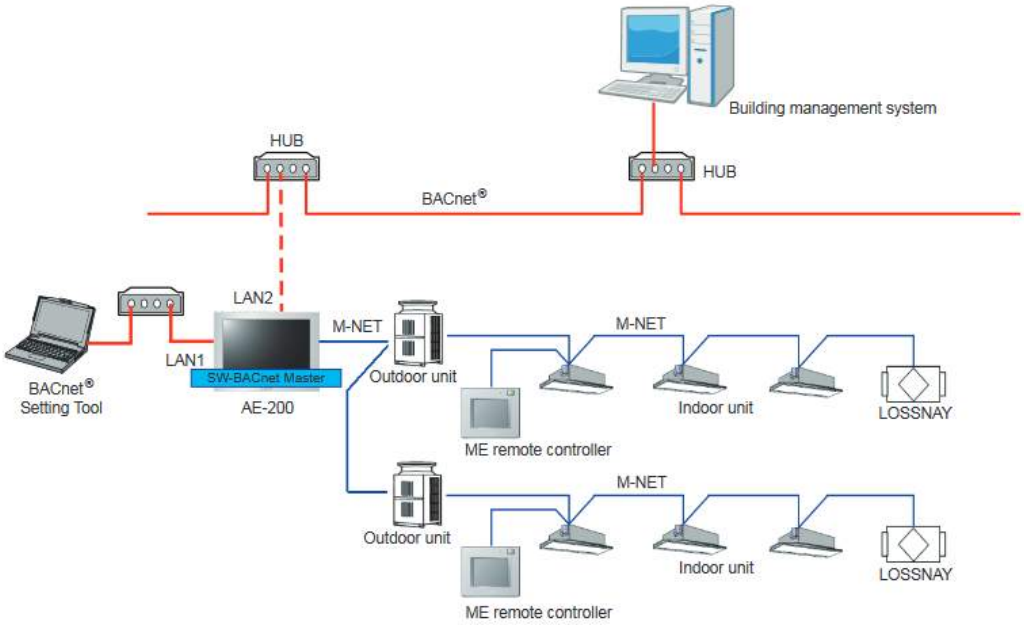
- Control up to 50 groups
- 1 to 16 indoor units can be collectively controlled in a group
- Supports dual set point functionality (connected model dependant)
- BTL Compliant
- BACnet communication specifications are based on ANSI/ASHRAE Standards 135-2010

4. PC Requirements:

- CPU: 1GHz or higher
- Memory: 1GB or more
- HDD Space: 100 MB or more
- Screen Resolution: 1024 x 768 or higher
- OS: Microsoft Windows 7 32-bit/64-bit, Microsoft 8.1 32-bit/64-bit. Not compatible with Windows Vista

- Execution Environment: Microsoft .NET Framework 4.5 or later
- Others: Pointing device such as a mouse, internet connection (required when installing a .NET Framework)

5. SW-BACnet – System Example



6. AE-200/AE-50/EW-50 BACnet Point List

Object List
On Off Setup
On Off State, Number of ON/OFF, Cumulative operation time
Alarm Signal (4-digit error code)
Error Code
Operational Mode Setup
Operational Mode State
Fan Speed Setup
Fan Speed State
Room Temp [Water Temp]
Set Temp [Set Water Temp]
Set Temp Cool
Set Temp Heat
Set Temp Auto
Filter Sign [Circulating Water Exchange Sign]
Filter Sign Reset [Circulating Water Exchange Sign Reset]
Prohibition On Off
Prohibition Mode
Prohibition Filter Sign Reset [Prohibition Circulating Water Exchange Sign Reset]
Prohibition Set Temperature

M-NET Communication State
System Forced Off
Air Direction Setup
Air Direction State
Set High Limit Setback Temp
Set Low Limit Setback Temp
Ventilation Mode Setup
Ventilation Mode State
Air To Water Mode Setup
System Alarm Signal (4-digit error code)
PI Controller Alarm Signal (4-digit error code)
Group Apportioned Electric Energy
Interlocked Units Apportioned Electric Energy
PI controller Electric Energy 1–4
Pulse Input Electric Energy 1–4
Group Apportionment Parameter
Interlocked Units Apportionment Parameter
Night Purge State
Thermo On Off State
Trend Log Room Temp
Trend Log Group Apportioned Electric Energy
Trend Log Interlocked Units Apportioned Electric Energy
Trend Log PI controller Electric Energy 1–4
Trend Log Pulse Input Electric Energy 1–4
Trend Log Group Apportionment Parameter
Trend Log Interlocked Units Apportionment Parameter

B. LMAP04U: LonWorks® Interface:

1. The Mitsubishi Electric Cooling & Heating LonWorks® interface, LMAP04U, shall support up to fifty indoor units with a variety of network variables on a per indoor unit basis. Input variables include, but are not limited to, on/off, operation mode, fan speed, prohibit remote controller, and filter sign reset. Output variables include, but are not limited to, model size, alarm state, error code, and error address.

END OF SECTION 238129

SECTION 260500 - GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Contractual Conditions and other Division 01 Specification sections apply to this section.

1.2 SUMMARY

A. This section includes Basic Electrical Requirements specifically applicable to Division 26 Sections.

1.3 DESCRIPTION

A. Provide and install all equipment, labor, material and accessories, and mounting hardware for a complete and operating system as described within these Division 26 Specification Sections.

B. Furnish, perform, or provide all labor including planning, purchasing, transporting, storing, installing, testing, cutting and patching, trenching, excavating, backfilling, coordination, field verification, equipment (installation and safety), supplies, and materials necessary for the installation of complete electrical systems (as described or implied by these specifications and the applicable drawings) in strict accordance with applicable codes, which may not be repeated in these specifications, but are expected to be common knowledge of qualified Bidders.

C. All work shall comply with all applicable codes as a minimum and with the additional requirements called for in these Contract Documents.

D. Only trained and licensed personnel shall perform work. No Work shall be performed which violates applicable Codes, even if called for in the Contract Documents.

E. Coordinate requirements with Utility Company.

F. Make connections of all items in the Work using electric power including wire, conduit, circuit protection, disconnects and accessories. Securing of roughing-in drawings and connection information for equipment involved shall also be included under this division. See other divisions for specifications for electrically operated equipment.

1.4 QUALITY ASSURANCE

A. Install Work in locations shown or described in the Contract Documents, unless prevented by Project conditions.

B. Install all equipment so that all Code and Manufacturer recommended working and servicing clearances are maintained. Properly arrange and install all equipment within designated spaces. If a departure from the Contract Documents is necessary, submit to the Engineer for approval, detailed drawings of the proposed changes with written reasons for the changes. No change shall be implemented without the issuance of a change order or other directive permitted by the General Conditions.

C. The Contractor shall verify finish dimensions at the project site in preference to using dimensions noted on Contract Documents.

1.5 INVESTIGATION OF SITE

A. Investigate the site and existing conditions thoroughly before bidding. Advise ENGINEER of discrepancies or questions noted.

B. During the course of the site visit, electrical bidder shall become familiar with all aspects of the proposed work and existing field conditions of the work. No compensation or reimbursement for additional expenses for failure to investigate the existing facilities will be authorized. This shall include rerouting around existing obstructions.

C. Submission of a proposal will be construed as evidence that such examination has been made and later claims for labor, equipment or materials required because of difficulties encountered will not be recognized.

D. Existing conditions and utilities indicated are taken from existing construction documents, surveys, and field investigations. Unforeseen conditions probably exist, and existing conditions shown on drawings may differ from the actual existing installation with the result being that new work may not be field located exactly as shown on the drawings. Notify ENGINEER if deviations are found.

E. All existing electrical is not shown. The Contractor shall become familiar with all existing conditions prior to bidding, and include in his bid the removal of all electrical equipment, wire, conduit, devices, fixtures, etc. that is abandoned due to renovation.

F. Protect all existing electrical raceways within concrete slabs, below concrete slabs, overhead raceways, equipment, etc. from damage due to renovation. Repair or replacement of utilities or other property damaged by operations in conjunction with the work will be at no cost to the Owner.

G. Remove existing power, lighting, systems, material and equipment which are made obsolete or which interfere with the construction of the project. Reinstall power, lighting, systems, materials and equipment which are required to remain active for the facility to be fully functional.

H. Reroute conduit and wiring in area of construction remaining active. Include temporary connections necessary to maintain continuity of existing circuitry required to remain active during renovation. Existing conduits indicated in Contract Documents are approximate locations only. Determine routing of existing conduits and pipes prior to any excavation, cutting or demolition.

I. Occupied existing buildings must remain in operation while work is being performed. Schedule work for a minimum outage to Owner. Notify the ENGINEER appropriately for any shut-down of existing systems.

J. Bid shall include all removal and relocation of all piping, fixtures or other items required for completion of alterations and new construction.

1.6 CONTRACT DOCUMENTS

A. The drawings are diagrammatic and are not intended to include every detail of construction, materials, methods, and equipment. They indicate the result to be achieved by an assemblage of various systems. Coordinate equipment locations with Architectural and Structural drawings. Layout equipment before installation so that all trades may install equipment in spaces available. Coordinate installation in a neat and workmanlike manner.

B. Contractor shall provide 1/4” scale coordination drawings for all electrical, mechanical and communications rooms during the shop drawing submittal phase, utilizing detailed dimensions from equipment actually submitted (all disciplines) and field-measured/verified existing conditions. These drawings are also required for any room where conduits equal to or over 1-1/4” in size, equipment (panels, HVAC, disconnects, comm. racks) or other large objects are being installed. Drawings shall show all electrical, mechanical, plumbing, fire protection, structural, etc. coordinated so that problems are discovered/prevented prior to installation. Claims during construction for additional funding in rooms where properly coordinated drawings were not submitted will not be considered.

C. Wiring arrangements for equipment shown on the drawings are intended to be diagrammatic and do not show all required conductors and functional connections. All such items incidental to a complete and operating system shall be provided.

D. Submit specific shop drawings which indicate the fabrication, assembly, installation, and erection of particular systems’ components. Drawings that are part of the Contract Documents shall not be considered a substitute for required shop drawings, field installation drawings, code requirements, or applicable standards.

E. Locations indicated for outlets, switches, and equipment are approximate and shall be coordinated with the Contract Documents. Where instructions or notes are insufficient to locate the item, notify the ENGINEER.

1.7 MATERIALS AND EQUIPMENT

A. Unless otherwise noted, all material shall be new and UL listed or labeled. In lieu of UL listing or labeling, a statement or data demonstrating compliance with contract documents from a nationally recognized testing agency shall be submitted to the ENGINEER.

B. Where Contract Documents list design selection, manufacturer or type, this model shall set the standard of quality and performance required. Where no brand name is specified, the source and quality shall be subject to Designers/ENGINEER review and approval. Where Contract Documents list approved substitutions, these items shall comply with Division 01 requirements for substitutions.

C. When a product is specified to be in accordance with a trade association or government standard and at the request of Designers/ENGINEER the Contractor shall furnish a certificate that the product complies with the referenced standard and supporting test data to substantiate compliance.

D. Where multiple items of the same equipment or materials are required, they shall be the product of the same Manufacturer.

E. Prior to placing equipment orders, verify the physical size of specified equipment to fit spaces allotted on the drawings and with NEC working clearances. Internal access for proposed equipment substitutions shall be provided. Provide 1/4” scale drawings showing that this coordination has taken place.

F. Electrical equipment shall be protected from the weather, during shipment, storage, and construction per manufacturer's recommendations. Should any apparatus be subjected to possible damage by water, it shall be thoroughly dried and put through a dielectric test, at the expense of the Contractor, to ascertain the suitability of the apparatus, or it shall be replaced without additional cost to the Owner.

G. Inspect all electrical equipment and materials prior to installation. Damaged equipment and materials shall not be installed or placed in service. Replace or repair and test damaged equipment in compliance with industry standards at no additional cost to the Owner. Equipment required for the test shall be provided by the Contractor.

H. Material and equipment shall be provided complete and shall function up to the specified capacity/function. Should any material or equipment as a part or as a whole fail to meet performance requirements, replacements shall be made to bring performance up to specified requirements. Damages to finish by such replacements, alterations, or repairs shall be restored to prior conditions, at no additional cost to the Owner.

I. Where tamperproof screws are specified or required, Phillips head or Allen head devices shall not be accepted. For each type used, provide ENGINEER with three tools. ENGINEER will designate the specific hardware design to correspond with existing devices elsewhere in the building, to limit special tool requirements.

J. Communications backboards shall be 3/4" A/B grade, Class A, flame spread, painted with light gray fire-retardant paint. Neatly mask off a minimum of one (1) plywood Manufactures pre-printed certified fire rating stamp per section of board prior to application of paint. Remove masking after paint has cured.

1.8 SUPERVISION OF THE WORK

A. Reference the General Conditions for additional requirements.

B. Provide field superintendent who has had a minimum of four (4) years previous successful experience on projects of comparable sizes and complexity. Superintendent shall be present at all times that work under this Division is being installed or affected. All work performed by a non-licensed Journeyman shall be under the direct supervision (in the presence of) of a Licensed Journeyman. At least one member of the electrical contracting firm shall hold a State Master Certificate of Competency. Each Journeyman shall have possession of licensing documentation at all times during work. Display to designer/ENGINEER when requested.

C. Superintendent shall be employed by a State Registered (Type "E.R." License) or State certified (Type "E.C." License) electrical contractor.

1.9 COORDINATION

A. Provide all required coordination and supervision where work connects to or is affected by work of others, and comply with all requirements affecting this Division. Work required under other divisions, specifications or drawings to be performed by this Division shall be coordinated with the Contractor and such work performed at no additional cost to Owner.

B. Provide electrical subcontractor a set of Contract Documents for all areas of Electrical Work.

C. Installation studies shall be made to coordinate the electrical work with other trades. Work shall be preplanned. Unresolved conflicts shall be referred to the ENGINEER prior to installation of the equipment.

D. Coordination drawings shall be prepared prior to the start of work. Drawings shall show the actual physical dimension required for the installation to assure proper integration of equipment with building systems and NEC required clearances. Location of conduit racking, etc., shall be provided. Coordination drawings shall be provided for all areas. Comply with the requirements of Division 01.

E. Secure approved shop drawings from all required disciplines and verify final electrical characteristics before roughing power feeds to any equipment. When electrical data on approved shop drawings differs from that shown or called for in Construction Documents, make adjustments to the wiring, disconnects, and branch circuit protection to match that required for the equipment installed. Adjustments to contract value will not be considered due to lack of coordination.

F. Damage from interference caused by inadequate coordination shall be corrected at no additional cost to the Owner.

G. Coordinate the exact location of floor outlets, floor ducts, floor stub-ups, etc. with ENGINEER and Designer (and receive their approval) prior to rough-in. Locations indicated in Contract Documents are only approximate locations.

H. The Contract Documents describe specific sizes of switches, breakers, fuses, conduits, conductors, motor starters and other items of wiring equipment. These sizes are based on specific items of power consuming equipment (heaters, lights, motors for fans, compressors, pumps, etc.). Coordinate the requirements of each load with each load's respective circuitry shown and with each load's requirements as noted on its nameplate data and manufacturer's published electrical criteria. Adjust circuit breaker, fuse, conduit, and conductor sizes to meet the actual requirements of the equipment being provided and installed and change from single point to multiple points of connection (or vice versa) to meet equipment requirements. Changes shall be made at no additional cost to the Owner.

1.10 PROVISION FOR OPENINGS

A. Locate openings required for work. Provide sleeves, guards or other approved methods to allow passage of items installed.

B. Coordinate with roofing Contractor on installation of electrical items which penetrate the roof. Roof penetrations shall be installed so as to not void roof warranty.

C. Where work pierces waterproofing, it shall maintain the integrity of the waterproofing. Coordinate roofing materials which pierce roof for compatibility with membrane or other roof types with Contractor.

1.11 CONCRETE PADS

A. Furnish and install reinforced concrete pads for transformers, switchgear, generators, motor control centers, and other free-standing equipment. Unless otherwise noted, pads shall be four (4) inches high and shall exceed dimensions of equipment being set on them, including future sections, by six (6) inches each side, except when equipment is flush against a wall where the side against the wall shall be flush with the equipment. Pads shall be reinforced with W1.4 x 1.4 6 x 6 welded wire mesh. Chamfer top edges 1/2". Trowel all surfaces smooth. Provide 3000 psi concrete.

1.12 SURFACE MOUNTED EQUIPMENT

A. Surface mounted fixtures, outlets, cabinets, conduit, panels, etc. shall have finish or shall be painted as directed by designer. Paint shall be in accordance with applicable sections and/or divisions of these specifications.

1.13 CUTTING AND PATCHING

A. Reference Division 01 - General Requirements.

B. New Construction:

1. Cutting of work in place shall be cut, drilled, patched and refinished by trade responsible for initial installation.

2. Backfill new grades to match adjacent undisturbed surface.

1.14 INSTALLATION

A. Erect equipment to minimize interference and delays with the execution of the Work.

B. Take care in erection and installation of equipment and materials to avoid marring finishes or surfaces. Any damage shall be repaired or replaced as determined by the designer/ENGINEER at no additional cost to the Owner.

C. Equipment requiring electrical service shall not be energized or placed in service until ENGINEER is notified and is present or have waived their right to be present. Where equipment to be placed in service involves service or connection from another Contractor or the ENGINEER, notify the ENGINEER in writing as appropriate when the equipment will be ready.

D. Equipment supports shall be secured and supported from structural members unless written approval is granted by ENGINEER.

E. Plywood material shall not be used as a backboard for mounting panel boards, disconnects, motor starters, and dry type transformers. Provide "cast in place" type inserts or install expansion type anchor bolts. Electrical equipment shall not be mounted directly to dry wall for support without additional channels as anchors. Channels shall be anchored to the floor and structure above. Panelboards and terminal cabinets shall be provided with structural framing located within drywall partitions.

F. Inserts, pipe sleeves, supports, and anchorage of electrical equipment shall be provided. Where items are to be set or embedded in concrete or masonry, the items shall be furnished and layout made for setting or embedment thereof so as to cause no delay.

G. Conduit or piping systems that contain water or liquid of any kind shall not be installed over the top of any electrical equipment, transformers, racks, cabinets, or enclosures without prior written approval from the OAR.

1.15 AS-BUILT DOCUMENTS

A. As-Built Documents: As-built Documents include Drawings, Shop Drawings, Specifications, Addenda, Change Orders, and other modifications permitted by the General Conditions.

B. Comply with all requirements of Division 01

C. Verify aspects of redlined as-builts for accuracy. As-Built Documents shall show all components including but not limited to:

1. All raceways 1-1/4" and above, cable tray systems, and grouped raceway racking as installed, including dimensions from fixed building lines such as column lines.
2. All site underground raceways and duct banks indicating burial depths and distances from fixed building lines or global tracking coordinates.

3. Underground pull boxes and manholes including elevations. Detail manhole and pull boxes, conduit terminations (butterfly layout) including conduit sizes, designated systems and cabling description.
4. General conduit routing from receptacle to receptacle, fixture to fixture, device to device. (Exact routing is not required for raceways 1” and smaller.)
5. Lighting: Diagrammatically show junction boxes that are located above accessible ceiling with flexible conduit connections to luminaries.
6. The first junction box within each homerun, regardless of size shall be shown in the installed location.
7. All junction boxes and pull boxes located above non-accessible ceilings shall be shown in exact location. All junction boxes 6”X6” and larger shall be shown in exact location.
8. Any combining of circuits (which is only allowed by specific permission) or change in homerun outlet box shall be indicated.
9. Any circuit number changes.
10. All conductors and cables, conductors and cable sizes, raceway sizes, etc not shown on contract documents and any changes from the documents.
11. Any switchboard, panelboard, motor control center, relay panel, or dimming control panel schedule changes, including load changes.
12. All access panels.
13. All existing conditions.
14. Location of lighting control devices such as photocell controls, space occupancy sensors, etc.
15. Exact quantity of conductors and cables shall be shown for all raceway systems.
16. All devices, wall outlet boxes, and control components.
17. All wireway and cable tray systems.
18. Exact location of all driven grounding electrodes including burial depths and dimensions from fixed building lines. Location of all grounding system busbars.
19. All building automation system (BAS) control panels and associated electrical devices, connections, power supplies, and dampers.
20. Riser diagrams exactly as installed.
21. Motor control devices, terminal cabinets, equipment racks, disconnects and switches and surge protection devices.
22. Change the equipment schedules (i.e. symbol legends, light fixture schedule, etc) to agree with items actually furnished.
23. Change plan notes to agree with items actually furnished, actual installation methods, etc. respectfully.
24. Cross-out all items, circuitry, devices, etc. not applicable.

D. As-Built red line information shall not compromise the clarity of the Contract Documents and Shop Drawings. Major components such as grouped raceway assemblies, cable tray systems, larger conduits, duct banks, racking, elevations, dimensions, etc. shall be shown on a clean architectural base plan(s) separate from the Contract Electrical Documents, as required to clearly delineate work. Obtain electronic base plan file from ENGINEER.

1.16 "OBSERVATION OF WORK" REPORT

A. Reference the General Conditions.

B. Items noted by designer/ENGINEER during construction and before final acceptance which do not comply with the Contract Documents will be listed in a "Observation of Work" report which will be sent to the Contractor for action. Correct all deficiencies in a prompt concise manner. After completion of the outstanding items, provide a written confirmation report for each item. The report shall indicate each item noted, and method of correction. Enter the date on which the item was corrected, and return the signed reports so items can be rechecked. Failure to correct the deficiencies in a prompt concise manner or failure to return the signed reports shall be cause for disallowing request for payments.

C. The electrical project superintendent shall be present at all required observation of work reviews as project progresses. Provide the ENGINEER with equipment for access and review of all Work in place, as well as personnel fully familiar with all aspects of the work. Provide access to all electrical components such as junction boxes, panelboards, switchboards, devices and fixtures for their review by the designer/ENGINEER.

D. Prior to start of Substantial Completion inspection, provide access to and prepare all electrical equipment and related components complete and ready for review by designer/OAR including but not limited to the following:

1. All panelboard covers removed
2. Switchboard and distributions panelboards readily for immediate removal of covers
3. Terminal cabinet covers open or removed.
4. Wireway covers open or removed
5. Underground pull boxes ready for immediate removal of cover(s)
6. Access to all grounding/bonding terminations
7. Access to rated wall and through floor fire stopping
8. Access to all control systems for the CCTV, Voice, Data, Fire Alarm, and Sound/Paging.
9. Access to mechanical equipment, electrical connection points, and control devices
10. Access to elevator and escalator machine rooms, hoistway, pits, etc.
11. Access to all raceways crossing structural expansion/deflection joints.
12. Access to all components of the fire alarm control system including control devices and fire dampers.
13. Access to power company equipment
14. Removal of access panels
15. Removal of a minimum of one (1) acoustical lay-in ceiling tile throughout each area of work. Larger areas shall have one (1)-ceiling tile removed for every 30 square foot of ceiling area.
16. Each and every item deemed necessary by A/E to perform a comprehensive review of the work as installed relative to the contract documents.

E. Items noted after acceptance during one-year guarantee period shall be checked by the Contractor in the same manner as above. The signed reports are to be returned by him when the items have been corrected.

1.17 SYSTEMS WARRANTY

A. Reference the General Conditions.

B. Warranty shall be by the Contractor to the Owner and shall cover for a period of one year from the date of the Substantial Completion. Warranty shall not include light bulbs lamps in service after one month from date of substantial completion of the System.

1. Explain the provisions of warranty to the Owner at the "Demonstration of Completed System" meeting to be scheduled with the OAR upon project completion.

C. Where items of equipment or materials carry a manufacturer's warranty for any period in excess of twelve (12) months, then the manufacturer's warranty shall apply for that particular piece of equipment or material.

D. Where extended Guarantees are called for herein, furnish three copies to be inserted in Operation and Maintenance Manuals.

E. All preventative maintenance and normal service will be performed by the Owner's maintenance personnel after final acceptance of the work which shall not alter the Contractor's warranty.

1.18 WASTE MATERIALS DISPOSAL

A. Include in base bid the transport and disposal or recycling of all waste materials generated by this project in accordance with all rules, regulations and guidelines applicable. Comply fully with Florida Statute 403.7186 regarding mercury containing devices and lamps. Lamps, ballasts and other materials shall be transported and disposed of in accordance with all DEP and EPA guidelines applicable at time of disposal.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 260500

SECTION 260519 - POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Building wires and cables rated 600 V and less.

2. Connectors, splices, and terminations rated 600 V and less.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

B. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN-2-THWN-2.

2.2 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 14 AWG and smaller; stranded for No. 12 AWG and larger

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN-2-THWN-2, single conductors in raceway

B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN-2-THWN-2, single conductors in raceway

C. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway

D. Feeders Installed below Raised Flooring: Type THHN-2-THWN-2, single conductors in raceway

E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-2-THWN-2, single conductors in raceway

F. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 "Raceways and Boxes" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.

F. Support cables according to Section 26 05 29 "Hangers and Supports."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than un-spliced conductors.

1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 26 05 53 "Identification."

B. Identify each spare conductor at each end with identity number and location of other end of conductor and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.7 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

3.8 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.

2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

B. Test and Inspection Reports: Prepare a written report to record the following:

1. Procedures used.

2. Results that comply with requirements.

3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

C. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes grounding and bonding systems and equipment.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.3 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.4 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 14 AWG and smaller, and stranded conductors for No. 12 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.

1. Bury at least 24 inches below grade.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches above to 6 inches below concrete. Seal floor opening with waterproof, non-shrink grout.

C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields according to written instructions by manufacturer of splicing and termination kits.

D. Pad-Mounted Transformers and Switches: Install two ground rods around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than No. 2 AWG for taps to equipment grounding terminals.

3.4 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.

C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

D. Water Heater, Heat-Tracing, and Anti-frost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

E. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

F. Metallic Fences: Comply with requirements of IEEE C2.

1. Grounding Conductor: Bare copper, not less than No. 8 AWG.
2. Gates: Shall be bonded to the grounding conductor with a flexible bonding jumper.
3. Barbed Wire: Strands shall be bonded to the grounding conductor.

3.5 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

C. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

D. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Section 26 05 43 "Underground Ducts and Raceways" and shall be at least 12 inches deep, with cover.

1. Test Wells: Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.

E. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

F. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to

a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

END OF SECTION 260526

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SECTION 260529 - HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.2 PERFORMANCE REQUIREMENTS

A. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.3 ACTION SUBMITTALS

A. Product Data: For steel slotted support systems.

B. Shop Drawings: fabrication and installation details and include calculations for the following:

1. Trapeze hangers. Include Product Data for components.
2. Steel slotted channel systems. Include Product Data for components.
3. Equipment supports.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
2. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
3. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
4. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with single-bolt conduit clamps using spring friction action for retention in support channel.

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT and RMC may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.

2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements

C. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Touchup: Comply with requirements for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

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SECTION 260533 - RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Boxes, enclosures, and cabinets.
5. Handholes and boxes for exterior underground cabling.

B. Related Requirements:

1. Section 26 05 43 "Underground Ducts and Raceways" for exterior ductbanks, hanholes, and underground utility construction.

1.2 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

B. Seismic Qualification Certificates: For enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. GRC: Comply with ANSI C80.1 and UL 6.

C. EMT: Comply with ANSI C80.3 and UL 797.

D. FMC: Comply with UL 1: aluminum.

E. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

F. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:

    a. Material: Steel.
    b. Type: Setscrew or compression.

3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.

G. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

C. LFNC: Comply with UL 1660

D. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 or Type 3R(exterior/wet locations) unless otherwise indicated, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.4 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A

C. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

D. Metal Floor Boxes:

1. Material: sheet metal.
2. Type: Fully adjustable
3. Shape: Rectangular.
4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

E. Nonmetallic Floor Boxes: Nonadjustable, rectangular.

1. Listing and Labeling: Nonmetallic floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.

G. Special Fan Outlet Boxes: As per manufacturer’s recommendation and in compliance with NEC requirements

H. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

I. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

J. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

K. Device Box Dimensions: 4 inches square by 2-1/8 inches deep

L. Gangable boxes are allowed.

M. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Fiberglass.
3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

N. Cabinets:

1. NEMA 250, Type 1 or Type 3R galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.5 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. General Requirements for Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.

1. Standard: Comply with SCTE 77.
2. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.

5. Cover Legend: Molded lettering, "ELECTRIC."
6. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC
2. Concealed Conduit, Aboveground: GRC or EMT.
3. Underground Conduit: RNC, Type EPC-40-PVC direct buried or concrete encased.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply raceway products as specified below unless otherwise indicated.

1. Exposed, Not Subject to Physical Damage: EMT or RMC.
2. Exposed, Not Subject to Severe Physical Damage: EMT
3. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:

    a. Corridors used for traffic of mechanized carts, forklifts, etc.
    b. Mechanical rooms.

4. Concealed in Ceilings and Interior Walls and Partitions: EMT or RMC
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: GRC.
7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4X stainless steel in damp or wet locations.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use setscrew or compression, fittings. Comply with NEMA FB 2.10.

4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

F. Install surface raceways only where indicated on Drawings.

G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

D. Arrange stub-ups so curved portions of bends are not visible above finished slab.

E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

F. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

G. Support conduit within 12 inches of enclosures to which attached.

H. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.

I. Stub-ups to Above Recessed Ceilings:

1. Use EMT or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

K. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

N. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

O. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces.

P. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

Q. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet.
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

    a. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per degree F of temperature change for PVC conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.

5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

R. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC in damp or wet locations not subject to severe physical damage.

S. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

T. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between the box and cover plate or the supported equipment and box.

U. Horizontally separate boxes mounted on opposite sides of walls, so they are not in the same vertical channel.

V. Locate boxes so that cover or plate will not span different building finishes.

W. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

X. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

Y. Set metal floor boxes level and flush with finished floor surface.

Z. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom for pipe less than 6 inches in nominal diameter.
2. Install backfill.
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction

4. Install manufactured duct elbows for stub-up at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
    b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

6. Underground Warning Tape: Comply with requirements in Section 26 05 53 "Identification."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

D. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.6 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

3.7 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 260543 - UNDERGROUND DUCTS AND RACEWAYS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Direct-buried conduit, ducts, and duct accessories.
2. Concrete-encased conduit, ducts, and duct accessories.
3. Handholes and boxes.

1.2 ACTION SUBMITTALS

A. Product Data: For ducts and conduits, duct-bank materials, handholes, and boxes, and their accessories.

B. Shop Drawings:

1. Precast or Factory-Fabricated Underground Utility Structures:

a. Include plans, elevations, sections, details, attachments to other work, and accessories.
b. Include duct entry provisions, including locations and duct sizes.
c. Include reinforcement and joint details, frame and cover design, and manhole frame support rings.

2. Factory-Fabricated Handholes and Boxes Other Than Precast Concrete:

a. Include dimensioned plans, sections, elevations, accessory locations, and fabrication and installation details.
b. Include duct entry provisions, including locations and duct sizes.

1.3 INFORMATIONAL SUBMITTALS

A. Duct-Bank Coordination Drawings: Show duct profiles, locations of expansion fittings, and coordination with other utilities and underground structures on Drawings signed and sealed by a qualified professional engineer.

B. Product Certificates: For concrete and steel used in precast concrete handholes, as required by ASTM C 858.

C. Qualification Data: For professional engineer and testing agency responsible for testing nonconcrete handholes and boxes.

D. Source quality-control reports.

E. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

1.5 FIELD CONDITIONS

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted by Owner and then only after arranging to provide temporary electrical service.

B. Ground Water: Assume ground-water level is 24 inches below ground surface unless a higher water table is noted on Drawings.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR DUCTS AND RACEWAYS

A. Comply with ANSI C2.

2.2 CONDUIT

A. RNC: NEMA TC 2, Type EPC-40-PVC UL 651, with matching fittings by same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.

2.3 NONMETALLIC DUCTS AND DUCT ACCESSORIES

A. Underground Plastic Utilities Duct: NEMA TC 2, UL 651, ASTM F 512, Type EPC-40, with matching fittings complying with NEMA TC 3 by same manufacturer as the duct.

B. Duct Accessories:

1. Duct Separators: Factory-fabricated rigid PVC interlocking spacers.
2. Warning Tape: Underground-line warning tape specified in Section 26 05 53 "Identification."
3. Concrete Warning Planks: Nominal 12 by 24 by 3 inches in size, manufactured from 6000-psi red concrete and labeled "ELECTRIC."

2.4 PRECAST CONCRETE HANDHOLES AND BOXES

A. Comply with ASTM C 858 for design and manufacturing processes.

B. Description: Factory-fabricated, reinforced-concrete, monolithically poured walls and bottom unless open-bottom enclosures are indicated. Frame and cover shall form top of enclosure and shall have load rating consistent with that of handhole or box.

1. Frame and Cover: Weatherproof cast-iron frame, with cast-iron cover with recessed cover hook eyes and tamper-resistant, captive, cover-securing bolts.
2. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
3. Cover Legend: Molded lettering, "ELECTRIC."
4. Configuration: Units shall be designed for flush burial and have open bottom unless otherwise indicated.
5. Extensions and Slabs: Designed to mate with bottom of enclosure. Same material as enclosure.

    a. Extension shall provide increased depth of 12 inches
    b. Slab: Same dimensions as bottom of enclosure and arranged to provide closure.

6. Joint Sealant: Asphaltic-butyl material with adhesion, cohesion, flexibility, and durability properties necessary to withstand maximum hydrostatic pressures at the installation location with the ground-water level at grade.
7. Windows: Precast, reinforced openings in walls, arranged to match dimensions and elevations of approaching ducts and duct banks, plus an additional 12 inches vertically and horizontally to accommodate alignment variations.
8. Duct Entrances in Handhole Walls: Cast end-bell or duct-terminating fitting in wall for each entering duct.
9. Handholes 12 inches wide by 24 inches long and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.

PART 3 - EXECUTION

3.1 UNDERGROUND DUCT APPLICATION

A. Ducts for Electrical Feeders 600 V and Less: RNC, NEMA Type EPC-40-PVC, in direct-buried duct bank unless otherwise indicated.

B. Ducts for Electrical Branch Circuits: RNC, NEMA Type EPC-40-PVC, in direct-buried duct bank unless otherwise indicated.

C. Underground Ducts Crossing Driveways and Roadways: RNC, NEMA Type EPC-40-PVC, encased in reinforced concrete.

3.2 UNDERGROUND ENCLOSURE APPLICATION

A. Handholes and Boxes for 600 V and Less:

1. Units in Roadways and Other Deliberate Traffic Paths: Precast concrete. AASHTO HB 17, H-10 structural load rating.
2. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Polymer concrete, SCTE 77, Tier 15 structural load rating.
3. Cover design load shall not exceed the design load of the handhole or box.

3.3 EARTHWORK

A. Excavation and Backfill: Do not use heavy-duty, hydraulic-operated, compaction equipment.

B. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary top-soiling, fertilizing, liming, seeding, sodding, sprigging, and mulching.

3.4 DUCT INSTALLATION

A. Install ducts according to NEMA TCB 2.

B. Slope: Pitch ducts a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope ducts from a high point in runs between two manholes, to drain in both directions.

C. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 48 inches both horizontally and vertically, at other locations unless otherwise indicated.

D. Joints: Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane.

E. Installation Adjacent to High-Temperature Steam Lines: Where duct banks are installed parallel to underground steam lines, perform calculations showing the duct bank will not be subject to environmental temperatures above 40 deg C. Where environmental temperatures are calculated to rise above 40 deg C, and anywhere the duct bank crosses above an underground steam line, install insulation blankets listed for direct burial to isolate the duct bank from the steam line.

F. Duct Entrances Concrete and Polymer Concrete Handholes: Use end bells, spaced approximately 10 inches o.c. for 5-inc ducts, and vary proportionately for other duct sizes.

1. Begin change from regular spacing to end-bell spacing 10 feet from the end bell without reducing duct line slope and without forming a trap in the line.

2. Direct-Buried Duct Banks: Install an expansion and deflection fitting in each conduit in the area of disturbed earth adjacent to manhole or handhole. Install an expansion fitting near the center of all straight line direct-buried duct banks with calculated expansion of more than 3/4 inch.
3. Grout end bells into structure walls from both sides to provide watertight entrances.

G. Building Wall Penetrations: Make a transition from underground duct to rigid steel conduit at least 10 feet outside the building wall, without reducing duct line slope away from the building, and without forming a trap in the line. Use fittings manufactured for duct-to-conduit transition. Install conduit penetrations of building walls.

H. Sealing: Provide temporary closure at terminations of ducts that have cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least 15-psig hydrostatic pressure.

I. Pulling Cord: Install 100-lbf test nylon cord in empty ducts.

J. Concrete-Encased Ducts: Support ducts on duct separators.

1. Excavate trench bottom to provide firm and uniform support for duct bank. Prepare trench bottoms for pipes less than 6 inches in nominal diameter.
2. Depth: Install top of duct bank at least 24 inches below finished grade in areas not subject to deliberate traffic, and at least 30 inches below finished grade in deliberate traffic paths for vehicles unless otherwise indicated.
3. Support ducts on duct separators coordinated with duct size, duct spacing, and outdoor temperature.
4. Separator Installation: Space separators close enough to prevent sagging and deforming of ducts, with not less than four spacers per 20 feet of duct. Secure separators to earth and to ducts to prevent floating during concreting. Stagger separators approximately 6 inches between tiers. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
5. Minimum Space between Ducts: 3 inches between ducts and exterior envelope wall, 2 inches between ducts for like services, and 4 inches between power and signal ducts.
6. Elbows: Use manufactured rigid steel conduit elbows for stub-ups at poles and equipment, at building entrances through floor, and at changes of direction in duct run.

    a. Couple steel conduits to ducts with adapters designed for this purpose and encase coupling with 3 inches of concrete.
    b. Stub-Ups to Equipment: For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of base. Install insulated grounding bushings on terminations at equipment.

7. Reinforcement: Reinforce concrete-encased duct banks where they cross disturbed earth and where indicated. Arrange reinforcing rods and ties without forming conductive or magnetic loops around ducts or duct groups.

8. Forms: Use walls of trench to form side walls of duct bank where soil is self-supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms.
9. Concrete Cover: Install a minimum of 3 inches of concrete cover at top and bottom, and a minimum of 2 inches on each side of duct bank.
10. Pouring Concrete: Place concrete carefully during pours to prevent voids under and between conduits and at exterior surface of envelope. Do not allow a heavy mass of concrete to fall directly onto ducts. Allow concrete to flow to center of bank and rise up in middle, uniformly filling all open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-bank application.

K. Direct-Buried Duct Banks:

1. Excavate trench bottom to provide firm and uniform support for duct bank.
2. Support ducts on duct separators coordinated with duct size, duct spacing, and outdoor temperature.
3. Space separators close enough to prevent sagging and deforming of ducts, with not less than four spacers per 20 feet of duct. Secure separators to earth and to ducts to prevent displacement during backfill and yet permit linear duct movement due to expansion and contraction as temperature changes. Stagger spacers approximately 6 inches between tiers.
4. Depth: Install top of duct bank at least 36 inches below finished grade unless otherwise indicated.
5. Set elevation of bottom of duct bank below frost line.
6. Install ducts with a minimum of 3 inches between ducts for like services and 6 inches between power and signal ducts.
7. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment, at building entrances through floor, and at changes of direction in duct run.

    a. Couple steel conduits to ducts with adapters designed for this purpose and encase coupling with 3 inches of concrete.
    b. For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

8. After installing first tier of ducts, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand place backfill to 4 inches over ducts and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction.

    a. Place minimum 3 inches of sand as a bed for duct bank. Place sand to a minimum of 6 inches above top level of duct bank.

L. Warning Planks: Bury warning planks approximately 12 inches above direct-buried ducts and duct banks, placing them 24 inches o.c. Align planks along the width and along the centerline of duct bank. Provide an additional plank for each 12-inch increment of duct-bank width over a nominal 18 inches. Space additional planks 12 inches apart, horizontally.

M. Warning Tape: Bury warning tape approximately 12 inches above all concrete-encased ducts and duct banks. Align tape parallel to and within 3 inches of centerline of duct bank. Provide an additional warning tape for each 12-inch increment of duct-bank width over a nominal 18 inches. Space additional tapes 12 inches apart, horizontally.

3.5 INSTALLATION OF HANDHOLES AND BOXES OTHER THAN PRECAST CONCRETE

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting ducts, to minimize bends and deflections required for proper entrances. Use box extension if required to match depths of ducts, and seal joint between box and extension as recommended by manufacturer.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas and trafficways, set cover flush with finished grade. Set covers of other handholes 1 inch above finished grade.

D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in enclosure.

E. Field cut openings for ducts and conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.6 GROUNDING

A. Ground underground ducts and utility structures according to Section 26 05 26 "Grounding and Bonding."

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:

1. Demonstrate capability and compliance with requirements on completion of installation of underground ducts and utility structures.

2. Pull solid aluminum or wood test mandrel through duct to prove joint integrity and adequate bend radii, and test for out-of-round duct. Provide a minimum 6-inch long mandrel equal to 80 percent fill of duct. If obstructions are indicated, remove obstructions and retest.
3. Test handhold grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Section 26 05 26 "Grounding and Bonding."

B. Correct deficiencies and retest as specified above to demonstrate compliance.

3.8 CLEANING

A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.

END OF SECTION 260543

SECTION 260553 - IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

1.2 ACTION SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

B. Colors for Raceways Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage and system or service type.

C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.2 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.3 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

2.4 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical utility lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

2.5 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

2.6 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16-inch-thick for signs up to 20 sq. inches and 1/8-inch-thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.7 EQUIPMENT IDENTIFICATION LABELS

A. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Apply identification devices to surfaces that require finish after completing finish work.

C. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

E. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

G. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30A, and 120V to ground: Install labels at 30-foot maximum intervals.

B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:

1. Emergency Power.
2. Power.
3. UPS.

C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit
b. Colors for 208/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.

c. Colors for 480/277-V Circuits:

1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.

d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

D. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.

E. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.

F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

G. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.

1. Limit use of underground-line warning tape to direct-buried cables.
2. Install underground-line warning tape for both direct-buried cables and cables in raceway.

H. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.
4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:

a. Power transfer switches.
b. Controls with external control power connections.

J. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

K. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch high letters for emergency instructions at equipment used for power transfer

L. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch high letters on 1-1/2-inch high label; where two lines of text are required, use labels 2 inches high.
b. Outdoor Equipment: Engraved, laminated acrylic or melamine label
c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.

d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

END OF SECTION 260553

SECTION 260574 - OVERCURRENT PROTECTIVE DEVICE ARC-FLASH STUDY

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes a computer-based, arc-flash study to determine the arc-flash hazard distance and the incident energy to which personnel could be exposed during work on or near electrical equipment.

1.2 ACTION SUBMITTALS

A. Product Data: For computer software program to be used for studies.

B. Other Action Submittals: Submit the following submittals after the approval of system protective devices submittals. Submittals shall be in digital form.

1. Arc-flash study input data, including completed computer program input data sheets.
2. Arc-flash study report; signed, dated, and sealed by a qualified professional engineer.

    a. Submit study report for action prior to receiving final approval of the distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that the selection of devices and associated characteristics is satisfactory.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Arc-Flash Study Specialist

B. Product Certificates: For arc-flash hazard analysis software, certifying compliance with IEEE 1584 and NFPA 70E.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance procedures according to requirements in NFPA 70E shall be provided in the equipment manuals.

B. Operation and Maintenance Procedures: In addition to items specified in Section 017823 "Operation and Maintenance Data," provide maintenance procedures for use by Owner's personnel that comply with requirements in NFPA 70E.

1.5 QUALITY ASSURANCE

A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are unacceptable.

B. Arc-Flash Study Software Developer Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.

1. The computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

C. Arc-Flash Study Specialist Qualifications: Professional engineer in charge of performing the study, analyzing the arc flash, and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.

D. Field Adjusting Agency Qualifications: An independent agency, with the experience and capability to adjust overcurrent devices and to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE DEVELOPERS

A. SKM (preferred) and ETAP

B. Comply with IEEE 1584 and NFPA 70E.

C. Analytical features of device coordination study computer software program shall have the capability to calculate mandatory features as listed in IEEE 399.

2.2 SHORT-CIRCUIT STUDY REPORT CONTENT

A. Executive summary.

B. Study descriptions, purpose, basis and scope.

C. One-line diagram, showing the following:

1. Protective device designations and ampere ratings.
2. Cable size and lengths.
3. Transformer kilovolt ampere (kVA) and voltage ratings.
4. Motor and generator designations and kVA ratings.

5. Switchgear, switchboard, motor-control center and panelboard designations.

D. Study Input Data: As described in "Power System Data" Article.

E. Short-Circuit Study Output:

1. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:

a. Voltage.
b. Calculated symmetrical fault-current magnitude and angle.
c. Fault-point X/R ratio.
d. No AC Decrement (NACD) ratio.
e. Equivalent impedance.
f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis.

F. Incident Energy and Flash Protection Boundary Calculations:

1. Arcing fault magnitude.
2. Protective device clearing time.
3. Duration of arc.
4. Arc-flash boundary.
5. Working distance.
6. Incident energy.
7. Hazard risk category.
8. Recommendations for arc-flash energy reduction.

G. Fault study input data, case descriptions, and fault-current calculations including a definition of terms and guide for interpretation of the computer printout.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine Project overcurrent protective device submittals. Proceed with arc-flash study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to arc-flash study may not be used in study.

3.2 SHORT-CIRCUIT STUDY

A. Perform study following the general study procedures contained in IEEE 399.

B. Calculate short-circuit currents according to IEEE 551.

C. Base study on the device characteristics supplied by device manufacturer.

D. The extent of the electrical power system to be studied is indicated on Drawings.

E. Begin analysis at the service, extending down to the system overcurrent protective devices as follows:

1. To normal system low-voltage load buses where fault current is 10 kA or less.
2. Exclude equipment rated 240-V ac or less when supplied by a single transformer rated less than 125 kVA.

F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Include studies of system-switching configurations and alternate operations that could result in maximum fault conditions.

G. The calculations shall include the ac fault-current decay from induction motors and shall apply to low-voltage, three-phase ac systems.

H. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault and single line-to-ground fault at each of the following:

1. Electric utility's supply termination point.
2. Switchgear.
3. Low-voltage switchgear.
4. Motor-control centers.
5. Standby generators and automatic transfer switches.
6. Branch circuit panelboards.

3.3 ARC-FLASH HAZARD ANALYSIS

A. Comply with NFPA 70E and its Annex D for hazard analysis study.

B. Use the short-circuit study output and the field-verified settings of the overcurrent devices.

C. Calculate maximum and minimum contributions of fault-current size.

1. The minimum calculation shall assume that the utility contribution is at a minimum and shall assume no motor load.
2. The maximum calculation shall assume a maximum contribution from the utility and shall assume motors to be operating under full-load conditions.

D. Calculate the arc-flash protection boundary and incident energy at locations in the electrical distribution system where personnel could perform work on energized parts.

E. Include low-voltage equipment locations, except 240-V ac and 208-V ac systems fed from transformers less than 125 kVA.

F. Safe working distances shall be specified for calculated fault locations based on the calculated arc-flash boundary, considering incident energy of 1.2 cal/sq.cm.

G. Incident energy calculations shall consider the accumulation of energy over time when performing arc-flash calculations on buses with multiple sources. Iterative calculations shall take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors shall be decremented as follows:

1. Fault contribution from induction motors should not be considered beyond three to five cycles.

H. Arc-flash computation shall include both line and load side of a circuit breaker as follows:

1. When the circuit breaker is in a separate enclosure.
2. When the line terminals of the circuit breaker are separate from the work location.

I. Base arc-flash calculations on actual overcurrent protective device clearing time. Cap maximum clearing time at two seconds based on IEEE 1584, Section B.1.2.

3.4 POWER SYSTEM DATA

A. Obtain all data necessary for the conduct of the arc-flash hazard analysis.

1. Verify completeness of data supplied on the one-line diagram on Drawings. Call discrepancies to the attention of Architect.
2. For new equipment, use characteristics submitted under the provisions of action submittals and information submittals for this Project.

B. Gather and tabulate the following input data to support coordination study.

1. Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Obtain electrical power utility impedance at the service.
3. Power sources and ties.
4. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
5. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
6. Motor horsepower and NEMA MG 1 code letter designation.
7. Low-voltage cable sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).

3.5 DEMONSTRATION

A. Engage the Arc-Flash Study Specialist to train Owner's maintenance personnel in the potential arc-flash hazards associated with working on energized equipment and the significance of the arc-flash warning labels.

END OF SECTION 26 05 74

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Time switches.
2. Photoelectric switches.
3. Indoor occupancy sensors.

B. Related Requirements:

1. Section 26 27 26 "Wiring Devices" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data

PART 2 - PRODUCTS

2.1 TIME SWITCHES

A. Electronic Time Switches: Solid state, programmable, with alphanumeric display; complying with UL 917.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Contact Configuration: DPST
3. Contact Rating: 30-A inductive or resistive, 240-V ac
4. Programs: Eight on-off set points on a 24-hour schedule
5. Programs: Two on-off set points on a 24-hour schedule, allowing different set points for each day of the week

6. Programs: 6 channels; each channel is individually programmable with eight on-off set points on a 24-hour schedule.
7. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program on selected channels.
8. Astronomic Time: All channels.
9. Automatic daylight savings time changeover.
10. Battery Backup: Not less than seven days reserve, to maintain schedules and time clock.

2.2 OUTDOOR PHOTOELECTRIC SWITCHES

A. Description: Solid state, with SPST dry contacts rated for 1800 VA, to operate connected load, complying with UL 773.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Light-Level Monitoring Range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range.
3. Time Delay: Thirty-second minimum, to prevent false operation.
4. Lightning Arrester: Air-gap type.
5. Mounting: Twist lock complying with NEMA C136.10, with base.

2.3 INDOOR OCCUPANCY SENSORS

A. Manufacturer: Lutron or equal

B. General Requirements for Sensors: Wall- or ceiling-mounted, solid-state indoor occupancy sensors with a separate power pack.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack.
4. Power Pack: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
5. Mounting:

    a. Sensor: Suitable for mounting in any position on a standard outlet box.

6. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
7. Bypass Switch: Override the "on" function in case of sensor failure.
8. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; turn lights off when selected lighting level is present.

C. Wall-Switch Sensor Tag WS1:

1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 900 sq. ft.
2. Sensing Technology: Dual technology - PIR and ultrasonic.
3. Switch Type: SP, manual "on," automatic "off
4. Voltage: Match the circuit voltage dual-technology type.
5. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc the switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
6. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
7. Concealed "off" time-delay selector at 30 seconds, and 5, 10, and 20 minutes.
8. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.

2.4 LIGHTING CONTACTORS

A. Description: Electrically operated and electrically held, combination-type lighting contactors with non-fused disconnect, complying with NEMA ICS 2 and UL 508.

1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).
2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
3. Enclosure: Comply with NEMA 250.

2.5 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 26 05 19 "Power Conductors and Cables."

B. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 26 05 19 "Power Conductors and Cables."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

B. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.

C. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.

D. Wiring Method: Comply with Section 26 05 19 " Power Conductors and Cables." Minimum conduit size is 1/2 inch

E. Identify components and power and control wiring according to Section 26 05 53 "Identification."

3.2 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate lighting control devices and perform tests and inspections.

B. Perform the following tests and inspections:

1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Lighting control devices will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 260923

SECTION 262200 - DRY-TYPE TRANSFORMERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Distribution dry-type transformers rated 600 V and less, with capacities up to 1500 kVA.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment.
3. Include diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For transformers, accessories, and components, from manufacturer.

B. Qualification Data: For testing agency.

C. Source quality-control reports.

D. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Temporary Heating: Apply temporary heat according to manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Square D

B. Eaton/Cutler Hammer

C. Siemens

D. General Electric

2.2 GENERAL TRANSFORMER REQUIREMENTS

A. Description: Factory-assembled and -tested, air-cooled units for 60-Hz service.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Transformers Rated 15 kVA and Larger: Comply with NEMA TP 1 energy-efficiency levels as verified by testing according to NEMA TP 2.

1. Coil Material: Copper.

D. Encapsulation: Transformers smaller than 30 kVA shall have core and coils completely resin encapsulated.

2.3 DISTRIBUTION TRANSFORMERS

A. Comply with NFPA 70, and list and label as complying with UL 1561.

B. Provide transformers that are constructed to withstand seismic forces.

C. Cores: One leg per phase.

D. Enclosure: Ventilated.

1. NEMA 250, Type 3R Core and coil shall be encapsulated within resin compound to seal out moisture and air.

E. Transformer Enclosure Finish: Comply with NEMA 250.

1. Finish Color: NSF/ANSI 49 gray

F. Taps for Transformers 25 kVA and Larger: Two 2.5 percent taps above and two 2.5 percent taps below normal full capacity

G. Insulation Class, Smaller than 30 kVA: 185 deg C, UL-component-recognized insulation system with a maximum of 115-deg C rise above 40-deg C ambient temperature.

H. Insulation Class, 30 kVA and Larger: 220 deg C, UL-component-recognized insulation system with a maximum of 150-deg C rise above 40-deg C ambient temperature.

I. K-Factor Rating: Transformers indicated to be K-factor rated shall comply with UL 1561 requirements for non-sinusoidal load current-handling capability to the degree defined by designated K-factor.

1. Unit shall not overheat when carrying full-load current with harmonic distortion corresponding to designated K-factor.
2. Indicate value of K-factor on transformer nameplate.
3. Unit shall meet requirements of NEMA TP 1 when tested according to NEMA TP 2 with a K-factor equal to one.

J. Electrostatic Shielding: Each winding shall have an independent, single, full-width copper electrostatic shield arranged to minimize interwinding capacitance.

1. Arrange coil leads and terminal strips to minimize capacitive coupling between input and output terminals.
2. Include special terminal for grounding the shield.

K. Neutral: Rated 200 percent of full load current for K-factor rated transformers.

2.4 IDENTIFICATION DEVICES

A. Nameplates: Engraved, laminated-plastic or metal nameplate for each distribution transformer, mounted with corrosion-resistant screws. Nameplates and label products are specified in Section 26 05 53 "Identification."

2.5 SOURCE QUALITY CONTROL

A. Test and inspect transformers according to IEEE C57.12.01 and IEEE C57.12.91.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify that ground connections are in place and requirements in Section 260526 "Grounding and Bonding for Electrical Systems" have been met. Maximum ground resistance shall be 5 ohms at location of transformer.

B. Environment: Enclosures shall be rated for the environment in which they are located. Covers for NEMA 250, Type 4X enclosures shall not cause accessibility problems.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Install transformers level and plumb on a concrete base with vibration-dampening supports. Locate transformers away from corners and not parallel to adjacent wall surface.

E. Construct concrete bases and anchor floor-mounted transformers according to manufacturer's written instructions and requirements in Section 26 05 29 "Hangers and Supports."

1. Coordinate size and location of concrete bases with actual transformer provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

F. Secure transformer to concrete base according to manufacturer's written instructions.

G. Secure covers to enclosure and tighten all bolts to manufacturer-recommended torques to reduce noise generation.

H. Remove shipping bolts, blocking, and wedges.

3.2 CONNECTIONS

A. Ground equipment according to Section 26 05 26 "Grounding and Bonding"

B. Connect wiring according to Section 26 05 19 " Power Conductors and Cables."

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

D. Provide flexible connections at all conduit and conductor terminations and supports to eliminate sound and vibration transmission to the building structure.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

1. Perform each visual and mechanical inspection and electrical test stated in NETA ATS for dry-type, air-cooled, low-voltage transformers. Certify compliance with test parameters.

B. Remove and replace units that do not pass tests or inspections and retest as specified above.

C. Infrared Scanning: Two months after Substantial Completion, perform an infrared scan of transformer connections.

1. Use an infrared-scanning device designed to measure temperature or detect significant deviations from normal values. Provide documentation of device calibration.
2. Perform two follow-up infrared scans of transformers, one at four months and the other at 11 months after Substantial Completion.
3. Prepare a certified report identifying transformer checked and describing results of scanning. Include notation of deficiencies detected, remedial action taken, and scanning observations after remedial action.

3.4 ADJUSTING

A. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 5 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.

B. Output Settings Report: Prepare a written report recording output voltages and tap settings.

END OF SECTION 262200

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SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes distribution panelboards and lighting and appliance branch-circuit panelboards.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types and details for types other than NEMA 250, Type 1.
3. Detail bus configuration, current, and voltage ratings.
4. Short-circuit current rating of panelboards and overcurrent protective devices.
5. Include evidence of NRTL listing for series rating of installed devices.
6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
7. Include wiring diagrams for power, signal, and control wiring.
8. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.

1.3 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: Submit certification that panelboards, overcurrent protective devices, accessories, and components will withstand seismic forces

B. Field quality-control reports.

C. Panelboard schedules for installation in panelboards.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA PB 1.

C. Comply with NFPA 70.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces

B. Enclosures: Surface-mounted cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: NEMA 250, Type 1
b. Outdoor Locations: NEMA 250, Type 3R or Type 4X stainless steel depending on the Owners Standards or requirements

2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
4. Directory Card: Inside panelboard door, mounted in transparent card holder.

C. Incoming Mains Location: Top and bottom.

D. Phase, Neutral, and Ground Buses: Hard-drawn copper, 98 percent conductivity.

E. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Main and Neutral Lugs: Mechanical type.
3. Ground Lugs and Bus Configured Terminators: Mechanical type.

F. Service Equipment Label: NRTL labeled for use as service equipment for panelboards with one or more main service disconnecting and overcurrent protective devices.

G. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

H. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to SEI/ASCE 7

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.3 DISTRIBUTION PANELBOARDS

A. Acceptable Manufacturers:

1. Eaton/Cutler Hammer
2. Square D
3. Siemens
4. General Electric

B. Panelboards: NEMA PB 1, power and feeder distribution type.

C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

D. Mains: Circuit breaker.

E. Branch Overcurrent Protective Devices: For Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.

F. Branch Overcurrent Protective Devices: For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Acceptable Manufacturers:

1. Eaton/Cutler Hammer
2. Square D
3. Siemens
4. General Electric

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Mains: Circuit breaker or lugs only as shown on contract drawings.

D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

F. Column-Type Panelboards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.

2.5 OVERCURRENT PROTECTIVE DEVICES

A. Acceptable Manufacturers:

1. Eaton/Cutler Hammer
2. Square D
3. Siemens
4. General Electric

B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:

    a. Instantaneous trip.
    b. Long- and short-time pickup levels.
    c. Long- and short-time time adjustments.
    d. Ground-fault pickup level, time delay, and I squared x t response.

4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
5. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
6. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
7. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
8. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:

    a. Standard frame sizes, trip ratings, and number of poles.
    b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
    c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
    d. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable
    e. Shunt Trip: 24-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.

2.6 ACCESSORY COMPONENTS AND FEATURES

A. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Receive, inspect, handle, store and install panelboards and accessories according to NEMA PB 1.1.

B. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."

C. Mount top of trim 90 inches above finished floor unless otherwise indicated.

D. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

E. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.

F. Install filler plates in unused spaces.

G. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.

H. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

I. Comply with NECA 1.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 26 05 53 "Identification."

B. Create a directory to indicate installed circuit loads and incorporating Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 26 05 53 "Identification."

D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Section 26 05 53 "Identification."

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Panelboards will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Weather-resistant receptacles.
3. Snap switches and wall-box dimmers.
4. Solid-state fan speed controls.
5. Wall-switch and exterior occupancy sensors.
6. Communications outlets.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with the requirements in this Section.

2.3 STRAIGHT-BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

2.4 GFCI RECEPTACLES

A. General Description:

1. Straight blade, non-feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

2.5 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Single Pole:

1) Cooper; AH1221.
2) Hubbell; HBL1221.
3) Leviton; 1221-2.
4) Pass & Seymour; CSB20AC1.

b. Two Pole:

1) Cooper; AH1222.
2) Hubbell; HBL1222.
3) Leviton; 1222-2.
4) Pass & Seymour; CSB20AC2.

c. Three Way:

1) Cooper; AH1223.
2) Hubbell; HBL1223.
3) Leviton; 1223-2.
4) Pass & Seymour; CSB20AC3.

2.6 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Smooth, high-impact thermoplastic 0.035-inch
3. Material for Damp Locations: Cast aluminum with spring-loaded lift cover and listed and labeled for use in wet and damp locations.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant die-cast aluminum with lockable cover.

2.7 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.
2. Wiring Devices Connected to Emergency Power System: Red
3. TVSS Devices: Blue.

B. Wall Plate Color: For plastic covers, match device color.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.

2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:

    a. Cut back and pigtail, or replace all damaged conductors.
    b. Straighten conductors that remain and remove corrosion and foreign matter.
    c. Pig-tailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.

I. Adjust locations of service poles to suit arrangement of partitions and furnishings.

3.2 GFCI RECEPTACLES

A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test Instruments: Use instruments that comply with UL 1436.
2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

C. Wiring device will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 262726

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SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Shunt trip switches.
4. Molded-case circuit breakers (MCCBs).
5. Enclosures.

1.2 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

C. SPDT: Single pole, double throw.

1.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For enclosed switches and circuit breakers, accessories, and components, from manufacturer.

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.7 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

A. Type HD, Heavy Duty, Six Pole, Single Throw, 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

B. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Lugs: Suitable for number, size, and conductor material.
5. Service-Rated Switches: Labeled for use as service equipment.

2.2 NONFUSIBLE SWITCHES

A. Type HD, Heavy Duty, Six Pole, Single Throw, 600-V ac, 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

B. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Lugs: Suitable for number, size, and conductor material.

2.3 SHUNT TRIP SWITCHES

A. General Requirements: Comply with ASME A17.1, UL 50, and UL 98, with 200-kA interrupting and short-circuit current rating when fitted with Class J fuses.

B. Switches: Three-pole, horsepower rated, with integral shunt trip mechanism and Class J fuse block; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.

C. Control Circuit: 120-V ac; obtained from with a control power source of enough capacity to operate shunt trip, connected pilot, and indicating and control devices.

D. Accessories:

1. Oiltight key switch for key-to-test function.
2. Oiltight ON pilot light.
3. Isolated neutral lug.
4. Mechanically interlocked auxiliary contacts that change state when switch is opened and closed.
5. Form C alarm contacts that change state when switch is tripped.
6. Three-pole, double-throw, fire-safety and alarm relay; 120-V ac coil voltage.
7. Three-pole, double-throw, fire-alarm voltage monitoring relay complying with NFPA 72.

2.4 MOLDED-CASE CIRCUIT BREAKERS

A. Acceptable Manufacturers:

1. Eaton/Cutler Hammer
2. Square D
3. Siemens
4. General Electric

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger

D. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Suitable for number, size, trip ratings, and conductor material.

2.5 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1
2. Outdoor Locations: NEMA 250, Type 3R or Type 4X stainless steel-Owner Preference

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Comply with mounting and anchoring requirements

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

D. Install fuses in fusible devices.

E. Comply with NECA 1.

3.2 IDENTIFICATION

A. Comply with requirements in Section 26 05 53 "Identification."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262816

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SECTION 264113 - LIGHTNING PROTECTION FOR STRUCTURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes lightning protection for structures and site components

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For air terminals and mounting accessories.

1. Layout of the lightning protection system, along with details of the components to be used in the installation.
2. Include indications for use of raceway, data on how concealment requirements will be met, and calculations required by NFPA 780 for bonding of grounded and isolated metal bodies.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Certified by UL or LPI as a Master Installer/Designer, trained and approved for installation of units required for this Project.

B. System Certificate:

1. UL Master Label.
2. LPI System Certificate.
3. UL Master Label Recertification.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 780, "Definitions" Article.

PART 2 - PRODUCTS

2.1 LIGHTNING PROTECTION SYSTEM COMPONENTS

A. Comply with UL 96 and NFPA 780.

B. Roof-Mounted Air Terminals: NFPA 780, Class I copper unless otherwise indicated.

1. Air Terminals More than 24 Inches Long: With brace attached to the terminal at not less than half the height of the terminal.
2. Single-Membrane, Roof-Mounted Air Terminals: Designed specifically for single-membrane roof system materials. Comply with requirements in roofing Sections.

C. Main and Bonding Conductors: Copper

D. Ground Loop Conductor: The same size and type as the main conductor except tinned.

E. Ground Rods: Copper-clad steel 3/4 inch in diameter by 10 feet

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install lightning protection components and systems according to UL 96A and NFPA 780.

B. Conceal the following conductors:

1. System conductors.
2. Down conductors.
3. Interior conductors.
4. Conductors within normal view of exterior locations at grade within 200 feet of building.

C. Cable Connections: Use crimped or bolted connections for all conductor splices and connections between conductors and other components. Use exothermic-welded connections in underground portions of the system.

D. Cable Connections: Use exothermic-welded connections for all conductor splices and connections between conductors and other components.

1. Exception: In single-ply membrane roofing, exothermic-welded connections may be used only below the roof level.

E. Air Terminals on Single-Ply Membrane Roofing: Comply with roofing membrane and adhesive manufacturer's written instructions.

F. Bond extremities of vertical metal bodies exceeding 60 feet in length to lightning protection components.

G. Ground Loop: Install ground-level, potential equalization conductor and extend around the perimeter of structure

1. Bury ground ring not less than 24 inches from building foundation.
2. Bond ground terminals to the ground loop.

3. Bond grounded building systems to the ground loop conductor within 12 feet of grade level.

H. Bond lightning protection components with intermediate-level interconnection loop conductors to grounded metal bodies of building at 60-foot intervals.

3.2 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.3 CORROSION PROTECTION

A. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture unless moisture is permanently excluded from junction of such materials.

B. Use conductors with protective coatings where conditions cause deterioration or corrosion of conductors.

3.4 FIELD QUALITY CONTROL

A. Notify Architect at least 48 hours in advance of inspection before concealing lightning protection components.

B. UL Inspection: Meet requirements to obtain a UL Master Label for system.

C. LPI System Inspection: Meet requirements to obtain an LPI System Certificate.

END OF SECTION 264113

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SECTION 264313 - SURGE PROTECTION POWER CIRCUITS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes field-mounted SPDs for low-voltage (120 to 600 V) power distribution and control equipment.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

2. Copy of UL Category Code VZCA certification, as a minimum, listing the tested values for VPRs, Inominal ratings, MCOVs, type designations, OCPD requirements, model numbers, system voltages, and modes of protection.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Sample Warranty: For manufacturer's special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to replace or replace SPDs that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL SPD REQUIREMENTS

A. SPD with Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. Comply with UL 1449.

D. MCOV of the SPD shall be the nominal system voltage.

2.2 SERVICE ENTRANCE AND TRANSFER SWITCH SUPPRESSOR

A. SPDs: Comply with UL 1449, Type 1

1. SPDs with the following features and accessories:

a. Integral disconnect switch.
b. Internal thermal protection that disconnects the SPD before damaging internal suppressor components.
c. Indicator light display for protection status.

B. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall not be less than 200 kA. The peak surge current rating shall be the arithmetic sum of the ratings of the individual MOVs in a given mode.

C. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 V three-phase, four-wire circuits shall not exceed the following:

1. Line to Neutral: 1200 V for 480Y/277 V
2. Line to Ground: 1200 V for 480Y/277 V
3. Line to Line: 2000 V for 480Y/277 V

D. Protection modes and UL 1449 VPR for 240/120 V, single-phase, three-wire circuits shall not exceed the following:

1. Line to Neutral: 700 V.
2. Line to Ground: 700 V
3. Line to Line: 1000 V.

E. SCCR: Equal or exceed 200 kA

F. Inominal Rating: 20 kA.

2.3 PANEL SUPPRESSORS

A. SPDs: Comply with UL 1449, Type 1

1. Include LED indicator lights for power and protection status.
2. Internal thermal protection that disconnects the SPD before damaging internal suppressor components.

B. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall not be less than 100 kA. The peak surge current rating shall be the arithmetic sum of the ratings of the individual MOVs in a given mode.

C. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 V three-phase, four-wire circuits shall not exceed the following:

1. Line to Neutral: 1200 V for 480Y/277 V
2. Line to Ground: 1200 V for 480Y/277 V
3. Neutral to Ground: 1200 V for 480Y/277 V
4. Line to Line: 2000 V for 480Y/277 V

D. Protection modes and UL 1449 VPR for 240/120-V, single-phase, three-wire circuits shall not exceed the following:

1. Line to Neutral: 700 V.
2. Line to Ground: 700 V.
3. Neutral to Ground: 700 V.
4. Line to Line: 1200 V.

E. SCCR: Equal or exceed 200 kA

F. Inominal Rating: 20 kA

2.4 ENCLOSURES

A. Indoor Enclosures: NEMA 250, Type 1.

B. Outdoor Enclosures: NEMA 250, Type 3R

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install an OCPD or disconnect as required to comply with the UL listing of the SPD.

C. Install SPDs with conductors between suppressor and points of attachment as short and straight as possible and adjust circuit-breaker positions to achieve shortest and straightest leads. Do not splice and extend SPD leads unless specifically permitted by manufacturer. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground.

D. Use crimped connectors and splices only. Wire nuts are unacceptable.

E. Complete startup checks according to manufacturer's written instructions. Energize SPDs after power system has been energized, stabilized, and tested.

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative.

1. Compare equipment nameplate data for compliance with Drawings and Specifications.
2. Inspect anchorage, alignment, grounding, and clearances.
3. Verify that electrical wiring installation complies with manufacturer's written installation requirements.

B. An SPD will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.3 DEMONSTRATION

A. Train Owner's maintenance personnel to operate and maintain SPDs.

END OF SECTION 264313

SECTION 265100 - INTERIOR & EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior and exterior lighting fixtures, lamps, and drivers
2. Emergency lighting units.
3. Exit signs.
4. Lighting fixture supports.

B. Related Sections:

1. Section 26 092 3 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
2. Section 26 27 26 "Wiring Devices"

1.2 ACTION SUBMITTALS

A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, and finishes.

B. Shop Drawings: Show details of nonstandard or custom lighting fixtures. Indicate dimensions, weights, methods of field assembly, components, features, and accessories. Product Certificates: For each type of ballast for bi-level and dimmer-controlled fixtures, from manufacturer.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements

2.2 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS-INTERIOR

A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

B. Metal Parts: Free of burrs and sharp corners and edges.

C. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.

D. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

E. Diffusers and Globes:

1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

a. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
b. UV stabilized.

2. Glass: Annealed crystal glass unless otherwise indicated.

F. Air-Handling Fluorescent Fixtures: For use with plenum ceiling for air return and heat extraction and for attaching an air-diffuser-boot assembly specified in Section 233713 "Diffusers, Registers, and Grilles."

1. Air-Supply Units: Slots in one or both side trims join with air-diffuser-boot assemblies.

2. Heat-Removal Units: Air path leads through lamp cavity.

3. Combination Heat-Removal and Air-Supply Unit: Heat is removed through lamp cavity at both ends of the fixture door with air supply same as for air-supply units.

4. Dampers: Operable from outside fixture for control of return-air volume.

5. Static Fixture: Air-supply slots are blanked off, and fixture appearance matches active units.

2.3 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS-EXTERIOR

A. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.

B. Lateral Light Distribution Patterns: Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

C. Metal Parts: Free of burrs and sharp corners and edges.

D. Sheet Metal Components: Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.

E. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.

F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.

G. Exposed Hardware Material: Stainless steel.

H. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

I. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.

J. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.

K. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

L. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.

M. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.

    a. Color: As selected from manufacturer's standard catalog of colors.

N. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.
3. Class I, Clear Anodic Finish: AA-M32C22A41 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
4. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

    a. Color: Dark bronze

O. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and drivers. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp and ballast characteristics:

    a. "USES ONLY" and include specific lamp type.
    b. CCT and CRI for all luminaires.

2.4 DRIVERS FOR LED LAMPS

A. General Requirements:

1. Comply with UL 935 and with ANSI C82.11.
2. Designed for type and quantity of lamps served.
3. Drivers shall be designed for full light output unless another BF,
4. Sound Rating: Class A
5. Total Harmonic Distortion Rating: Less than 20 percent.
6. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
7. Operating Frequency: 42 kHz or higher.
8. Lamp Current Crest Factor: 1.7 or less.

9. BF: 0.88 or higher.
10. Power Factor: 0.95 or higher.

2.5 EXIT SIGNS

A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

B. Internally Lighted Signs:

1. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
2. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.

    a. Battery: Sealed, maintenance-free, nickel-cadmium type.
    b. Charger: Fully automatic, solid-state type with sealed transfer relay.
    c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
    d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
    e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

2.6 EMERGENCY LIGHTING UNITS

A. General Requirements for Emergency Lighting Units: Self-contained units complying with UL 924.

1. Battery: Sealed, maintenance-free, lead-acid type.
2. Charger: Fully automatic, solid-state type with sealed transfer relay.
3. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
4. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
5. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
6. Wire Guard: Heavy-chrome-plated wire guard protects lamp heads or fixtures.
7. Integral Time-Delay Relay: Holds unit on for fixed interval of 15 minutes when power is restored after an outage.

2.7 LED LIGHT SOURCES

A. The LED light source must indicate and/or take into consideration the key parameters and components

1. UL listing and label
2. Minimum lumen output
3. Light loss factor (LLF)
4. IES Light Measurement LM-79: Electrical and Photometric Measurements of Solid State Lighting Products.
5. IES LM-80: Measuring Lumen Maintenance of LED Light Sources
6. IES Technical Memorandum TM-21 Projecting Long Term Lumen Maintenance of LED Light Sources
7. Minimum lifespan (LED Component and driver)
8. Minimum color rendering index (CRI)
9. Color Temperature
10. LEDs from the same batch
11. Inrush current
12. Surge protection
13. Radio frequency interference (RFI), total harmonic distortion (THD), power factor
14. Warranty and availability of replacement parts

Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers

2.8 LIGHTING FIXTURE SUPPORT COMPONENTS

A. Comply with Section 26 05 29 "Hangers and Supports" for channel- and angle-iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.

C. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.

D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage

E. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage

F. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

G. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

B. Comply with NFPA 70 for minimum fixture supports.

C. Suspended Lighting Fixture Support:

1. Pendants and Rods: Where longer than 48 inches brace to limit swinging.
2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.

D. Air-Handling Lighting Fixtures: Install with dampers closed and ready for adjustment.

E. Adjust aimable lighting fixtures to provide required light intensities.

F. Adjust luminaires that require field adjustment or aiming

G. Connect wiring according to Section 26 05 19 " Electrical Power Conductors."

3.2 FIELD QUALITY CONTROL

A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.

B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 265100

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SECTION 270500 - COMMON WORK ELEMENTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 STIPULATIONS

A. Project drawings and general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, Division 01 Specification Sections and stipulated Specification Sections shall apply to this and all related Division 27 Specification Sections.

B. Due to the scale of the drawings, symbols are shown on drawings as close as possible to the mounting location. Contractor shall coordinate exact location of all network systems and related components with all related Contract drawings, specifications and affected trades prior to submittal of shop drawings.

C. Definitions:

1. Contract Documents: The documents consisting of the Form of Agreement between Airport and Contractor, Conditions of the Contract, (General, Supplementary, and other Conditions), Drawings, Specifications and all Addenda issued prior to the execution of the Contract.
2. Contract Drawings: The drawings that form a part of the Contract Documents that provides the graphical representation of the project requirements intended design and/or performance criteria to be delivered by the Contractor.
3. Reference Drawings: A drawing and/or set of drawings produced by a proprietary supplier, manufacturer, subcontractor, or fabricator included in the Contract Documents for informational purposes, providing specific information related to the installation of related appurtenances, components, devices, hardware, products, and/or systems. Reference Drawings shall also include any Contract Drawings from prior bid packages that may have pertinent information or require coordination of trades related to this contract.
4. Shop Drawings: A drawing and/or set of drawings produced by the contractor, supplier, manufacturer, subcontractor, or fabricator as a detailed representation of the proper installation of the related, appurtenance, component, device, hardware, product, and/or system to be delivered in conformance to the requirements of the Contract Documents.

1.2 SUMMARY

A. This Section contains the overall requirements associated with all Division 27 and related Division 28 Specification Sections.

B. In addition, this section shall address all requirements for submittals, quality assurance, product handling, record documents, project conditions, installation, system performance, demonstrations, testing, and certifications for all scopes of work related to network communication cabling for this project scope of work. Refer to related Division 26, 27 and 28 specification sections and all contract drawings for additional requirements.

C. The Division 27 Information Communications Technology Integrator (ICTI) shall be a sub-contractor to the Contractor. This integrator shall have overall responsibility for all designs, equipment and all technical support related to all Division 27 scopes of work and shall ensure full coordination of all work as required to provide fully operational communications infrastructures and systems in accordance with all requirements of the Contract Documents, applicable Codes and Standards.

1. The ICTI shall be responsible for providing all equipment, devices, system components, final cable terminations, commissioning, and testing of all network communications cabling and equipment in accordance with all related Division 27 specification sections.
2. All sub-contractors shall meet the minimum technical capabilities, certifications, and licensing requirements as defined by the “Quality Assurance” chapter as specified herein as well as all related specification sections.

D. It shall be the responsibility of the Contractor to furnish and install all necessary cabling, conduits/raceways, cable terminations, controls, systems, materials, devices, components, electrical power, equipment racks/cabinets and software as well as all appurtenances, programming, commissioning and testing necessary to deliver a complete and fully operational communications network infrastructures and systems as indicated by the contract documents.

E. Any deviations from the specified criteria shall be documented, reviewed, and agreed to in writing by the Airport and the Engineer of Record prior to submission of bids. Refer to Division 01, and all related Division 27 Specification Sections for any substitutions and/or project deviation requests.

1. The required information shall include but not be limited to: reason for deviation, all differences in performance, operation, and function from the herein specified requirements, all benefits, and added features to the Airport as a result of the deviations and any additional incurred costs to the Authority for maintenance and long-term ownership.
2. Failure to provide the Airport and the Engineer of Record with the required information shall result in any shop drawing submissions being returned for non-conformance with the contract requirements.

F. Prior to the submission of the Bid any discrepancies or inconsistencies noted within these specifications and/or the project drawings shall be brought to the immediate attention of the Airport the Engineer of Record.

G. All device symbols are defined by the appropriate symbol schedules as indicated by the symbol and abbreviation drawing sheets for each discipline. The Contractor shall coordinate exact locations with all architectural, mechanical, electrical, reflected ceiling, furniture drawings and door hardware specifications as well as all affected trades prior to submittal of bids.

1. All symbols are shown on the contract drawings as close as possible to their intended location. Contractor shall coordinate the installation of all equipment, devices, controls, components, cabling conduits/raceways and integration of other systems with all affected trades and specified system integrators. The contractor shall document all coordination requirements at the time of shop drawing submission.
2. Drawings for this work are diagrammatic and intended to convey the extent, general arrangement, and locations of the work. Because of the scale of the drawings, certain basic items such as access panels, conduits, cabinet sizes, penetration sleeves, pull boxes, back-boxes and junction boxes may or may not be shown on the contract drawings. Include all items where required by code and related specification sections for proper installation of all work.

H. Project specifications and drawings may not deal individually with every part, control, device, component, or appurtenance which may be required to produce the equipment performance for the specified system and/or as required for compliance with all specified systems integration.

1. Include such items and components, as required, for complete operational systems as defined by the project documents, whether or not specifically indicated. The contractor shall be responsible for providing conduits/raceways, cable terminations, controls, systems, equipment, materials, devices, components, electrical power, equipment racks/cabinets, software, programming, commissioning, testing and all appurtenances as well as the integration of any ancillary systems or Authority provided equipment/components/systems.
2. Coordinate with other applicable trades in submittal of shop drawings and the installation of all systems. All shop drawings shall detail space conditions in order to accommodate other concerned trades, all equipment locations are subject to final review by the Airport and the Engineer of Record.

I. All Division 27 scopes of work shall include the necessary labor, software, equipment, materials, devices, cabling, conduits and electrical power as well as the performance of all system programming, testing and commissioning as required to provide fully operational systems in accordance with all requirements of the project documents.

1. All Division 27 systems work shall include the labeling of all wire terminations and enclosure locations. All wiring shall terminate on fixed terminal strips, punch blocks, or patch panels in accordance with all requirements of the project drawings and related specifications.

    a. No splices shall be permitted in underground maintenance holes and non-accessible junction boxes. All junction boxes containing any system splices shall be uniquely identified.
    b. All mounting heights and accessibility to all equipment requiring access by individuals with disabilities shall comply with ANSI A117.1 requirement.
    c. All equipment enclosures located outside or in all areas with high moisture or high humidity shall be NEMA 4X enclosures and rated for that application.

d. All devices, components, or equipment installed on the exterior of the facility shall be provided in accordance with all manufacturers' requirements to ensure the proper operation when exposed to the environmental conditions and/or average annual lowest temperature that can be anticipated for the geographic region of the facility.
e. All interior devices exposed to the general population shall be installed in secured equipment enclosures and installed in such a manner that resists tampering and/or removal without the use of specialized tools.

2. All work shall be neat in appearance, free of rough edges, scratches, blemishes, cracks and exposed gaps. All equipment shall be secured to the mounting surface, and fastened with hardware approved by the manufacturer and capable of supporting the rated load. All cables within enclosures shall be neatly routed and tie wrapped at 6 inches on center. All wire splices shall be terminated on terminal strips and/or soldered in place. Any splices utilizing wire nuts shall not be acceptable.

J. Use of Premises

1. The Contractors shall have limited use of premises for construction operations only as required to meet the scope of work as delineated by the Contract Documents.

2. The Contractor shall design, prepare, schedule, and coordinate all scopes of work without disruption of any existing system functions or the daily operation of the existing facility. All cabling and equipment shall be installed in such a manner that all new controls, equipment and/or devices shall be installed, programmed and tested prior to modification, switch over and/or disconnecting of any existing systems.

a. Include all costs related to any phased construction methodologies having to do with the scope of work defined herein, including, but not limited to, all necessary temporary equipment, devices, components or systems as well as any labor costs associated with any installation, commissioning, testing demolition of any technology systems required to be performed after normal business hours of the facility.
b. Prior to the disabling, modifications, switchover and/or demolition of any existing system components and/or cabling, all new system components, equipment, conduits, cabling, shall be in place, tested and fully operational.
c. The contractor shall coordinate all installation activities so as not to disrupt the daily operations of the airport and shall include any costs related to a phased construction methodology where applicable. Installation activity and costs shall include but are not limited all necessary temporary equipment, devices, components or systems as well as any labor costs associated with any installation, commissioning, testing demolition of any systems required to be performed after normal business hours of the facility.

3. Contractor shall plan, schedule and install all scopes of work in accordance with all requirements of the project construction schedule. Refer to related specification sections for additional information related to project scheduling and facility access.

a. The contractor shall coordinate all installation and demolition activities so as not to disrupt the daily routine of the existing facility or negatively impact the integrity of the facility's security and life safety measures.

K. Coordination

1. The Contractor shall coordinate with all Division 27 integrators, Division 28 Contractors, and all sub-contractors as well as all other applicable trades in the submittal of shop drawings and the installation of all equipment, devices, and systems. All shop drawings shall detail space conditions in order to accommodate other concerned trades, all equipment and device locations are subject to final review by the Airport and the Engineer of Record.

    a. If installation of equipment, raceways, cable trays, and/or conduit is performed prior to coordination with all other trades, which interferes with work of other trades or the performance of the system, the contractor shall make necessary changes to correct the condition at no additional cost to the Airport.
    b. Provide all cabling, conduits, terminations, and programming to properly interface the BAS, fire alarm and access control systems with all related mechanical, elevator fire and security systems in accordance with all applicable life safety codes and/or in accordance with all requirements of the project drawings and related specifications.
    c. The division 27 Contractors shall coordinate with all applicable systems contractors to ensure the proper integration and performance requirements of all Division 28 systems as required by Code, Contract Documents, and the AHJ.

2. Where applicable, contractor shall coordinate all service, rework, and relocation of existing utilities prior to bid. Bid shall include all work required for any connections/interfacing with existing systems and/or utilities.
3. Coordinate all work involving tenant leased areas or equipment for rework, relocation, and addition of equipment and devices, including any modification to existing system infrastructures with the Airport and the Engineer of Record.

1.3 REFERENCES

A. References to industry and trade association standards as well as all building codes are minimum installation requirements. The codes, standards, and agencies listed below shall form a part of all related specification sections and all work shall comply with the latest adopted standards.

B. Authority Having Jurisdiction: The system shall comply with all applicable Codes, Ordinances and Standards as interpreted and enforced by the local authority having jurisdiction.

C. Local Adoption and Amendments: Follow the locally adopted version of all codes and standards. Where local jurisdictions or governments include amendments to codes including the National Electrical Codes, national health & safety codes, radio frequency regulations, or other building codes, the Contractor shall follow the locally amended versions and amendments.

D. Publication Dates: Comply with published standards in effect as of date of the Contract Documents unless otherwise indicated.

1. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity.
2. Copies of applicable standards are not bound with the Contract Documents.
3. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

E. Where the contract drawings and specifications mandate a greater requirement or performance than those specified by any of the below referenced codes and standards, the Contract Documents shall then be the governing requirements for this project. The minimum codes and standards to be applied for this project shall be the following;

1. National Fire Protection Association (NFPA):

   a. NFPA-70: National Electrical Code (NEC)
   b. NFPA-72: National Fire Alarm and Signaling Code
   c. NFPA-75: Standard for the Protection of Information Technology Equipment
   d. NFPA 76: Standard for the Fire Protection of Telecommunications Facilities
   e. NFPA-101: Life Safety Code
   f. NFPA 297: Guide on Principles and Practices for Communications Systems

2. American National Standards Institute (ANSI) / Telecommunications Industry Association/Electronics Industry Alliance (TIA/EIA): Comply with the following Electronics Industries Association Standards:

a.	ANSI/TIA-455:	"FOTP-61, Measurement of Fiber or Cable Attenuation Using an OTDR"
b.	ANSI/TIA-492-A:	"Detail Specification for 850-nm Laser Optimized 50-µm Core Diameter/125µm Cladding Diameter Class 1a Graded Index Multi-Mode Optical Fibers"
c.	ANSI/TIA-492-CAAA:	Detail Specification for Single-Mode Optical Fiber
d.	ANSI/TIA/EIA-526-7:	Measurement of Optical Power Loss of Installed Single Mode Fiber Cable Plant (Method A)
e.	ANSI/TIA/EIA-526-14A:	Measurement of Optical Power Loss of Installed Multimode Fiber Cable Plant
f.	ANSI/TIA-568-C:	"Commercial Building Telecommunication Standard"
g.	ANSI/TIA-569:	"Telecommunications Pathways and Spaces""
h.	ANSI/TIA-606-B:	"The Administration Standard for the Telecommunications Infrastructure of Commercial Building"
i.	ANSI/TIA-607-A:	"Commercial Building Grounding and Bonding Requirements for Telecommunications"
j.	ANSI/TIA-758-A:	Customer Owned Outside-Plant Telecommunications Infrastructure Standard

k.	ANSI/TIA/EIA/IS-811:	Telephone Terminal Equipment, Performance and Interoperability for VoIP Feature Telephones.
l.	ANSI/TIA/EIA-854:	Full Duplex Ethernet Specification for 1000Mbps Operating Over Category 6 Balanced Twisted Pair Cabling
m.	ANSI/TIA-862-A:	Building Automation Systems Cabling
n.	ANSI/TIA-1005-A:	Telecommunications Infrastructure Standard for Industrial Premises
o.	ANSI/TIA-1152:	Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
p.	ANSI/TIA-1183:	Measurement Methods and Test Fixtures for Balun-Less Measurements of Balanced Components and Systems

3. American Society for Testing and Materials (ASTM).

4. Americans With Disabilities Act (ADA) 2014 ADAAG.

5. Underwriters Laboratories, Inc.:

   a. UL 486A: “Wire connectors and soldering lugs for use with copper conductors”
   b. UL 1449: “Transient voltage surge suppressors”
   c. UL 1581: “Standard for Electrical Wires, Cables, and Flexible Cords”
   d. UL 478: “Standard for Electronic Data-Processing Units and Systems
   e. UL 83:"Thermoplastic-Insulated Wires and Cables,"
   f. UL 910: "Test Method for Fire and Smoke Characteristics of Cables Used in Air-Handling Spaces." Provide products which are UL-listed and labeled.
   g. UL Certified - UL's LAN Cable Certification Program Federal Communications Commission:

6. International Code Council

   a. Florida Building Code 5th Edition (2014) Accessibility
   b. Florida Building Code 5th Edition (2014) Building
   c. Florida Building Code 5th Edition (2014) Energy Conservation
   d. Florida Building Code 5th Edition (2014) Mechanical
   e. Florida Building Code 5th Edition (2014) Plumbing

7. Florida Fire Prevention Code, 5th Edition (2014) Institute of Electrical and Electronic Engineers (IEEE)

   a. IEEE 802.1, Bridging and Management
   b. IEEE 802.3, Standard for Ethernet (2012 with published amendments)
   c. IEEE 802.11 Wireless LANs

8. NEMA/ICEA Compliance:

a. WC-5 - "Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy,"
b. WC30 - "Color Coding of Wires and Cables," pertaining to control and signal transmission media.

9. Internet Networking Standards: Network hardware and software shall be able to communicate with the Internet and provide for the creation of IP based networks for the Agency. All supplied hardware shall comply with the following minimum standards and RFC's as appropriate.

a. RFC 950 - Internet Standard Sub-Netting Procedure
b. RFC 1140 - Official Protocol Standards
c. RFC 1156 - MIB Base for IP Networks
d. RFC-1213 - MIB-II
e. RFC-1757 - Remote Monitoring (RMON)
f. RFC 1157 - Simple Network Management Protocol
g. RFC 1720 - TCP/IP, OSI Compliant
h. RFC 1918 - Address Allocation for Private Subnets
i. RFC 1583 - OSPF, Version II
j. RFC 1723 - RIP -II

10. ASTM Compliance: Comply with applicable requirements of D-2219 and D-2220. ASTM Compliance: Comply with applicable requirements of D-2219 and D-2220.

11. Building Industry Consulting Service International (BICSI)

a. ANSI/BICSI-002, Data Center Design Standard and Recommended Practices
b. Electronic Safety and Security Design Reference Manual (ESSDRM)
c. Information Technology Systems Installation Manual (ITSIMM)
d. Outside Plant Design Reference Manual (OSPDRM)
e. Telecommunications Distribution Methods Manual (TDMM)

12. Safety Code for Elevators and Escalators – American Society of Mechanical Engineers (ASME 17.1).

13. Federal Communications Commission:

a. FCC Regulations Part 15 Title 47.
b. FCC: Federal Communication Commission Part 68 as modified by Wiring Docket 88-57.

14. The contractor shall comply with the requirements of Pinellas County Vertical Construction Standards. If a conflict arises between this specification section and the Pinellas County Vertical Construction Standards, the Pinellas County Vertical Construction Standards shall apply.

1.4 SUBMITTALS

A. Refer to related Div. 27 Specification for specific submittal requirements

1.5 QUALITY ASSURANCE

A. Integrator Qualifications: The projects' Information Communications Technology Integrator (ICTI) shall be an accredited and authorized distributor of the appropriate equipment manufacturer and shall be fully certified in the installation, testing and programming of all equipment being provided.

1. The ICTI integrator shall be capable of providing documented successful work experience of at least three (3) facilities of equivalent size and technical requirements utilizing the proposed equipment being provided. The system integrator shall have on staff a minimum of one full time individual that holds a current RCDD registration.

2. Cable Installer Qualifications: The cable installation contractor shall demonstrate not less than three (3) years' experience in the installation of structured cabling systems and shall have on staff a minimum of one full time member that holds a current BICSI level II installer credential.

a. The installation of all communications cabling shall be under the direct supervision of a current BICSI level II installer who shall be knowledgeable in the following technical applications:

1) The Routing and installation of shielded, unshielded, twisted pair, coaxial and fiber optic cables.
2) Bonding and grounding of cable tray and equipment racks.
3) Fusion splicing of fiber optic cabling.
4) Testing copper conductors for electrical continuity.
5) Testing and Certifying of UTP structured cabling for attenuation and worst case near end cross talk.
6) Testing and Certifying of ALL fiber optic cabling employing an Optical Time Domain Reflectometer (OTDR) in accordance with TIA/EIA protocols.
7) Testing and Certifying of coaxial cable networks for RF leakage
8) Termination, connection, and testing of shielded and un- shielded twisted pair cable, coaxial cabling, and fiber optic cabling on all specified connectors, electrical protection blocks, termination blocks, and patch panels.
9) Generally accepted industry standards, as well as manufacturers written installation instructions, will be used for in-process quality control and final acceptance of the work installation.

3. The Airport and the Engineer of Record reserves the right to require the Contractor to submit a list of installations where the products have been in operation before approval

a. Experience shall be defined as the completion of the specific system being provided, with that system being successfully operated by the Airport and the Engineer of Record for its intended purpose for at least three (3) years.
b. In addition to the above "Experience" shall also be defined as the completion of modifications and renovations to any associated system being provided in any existing occupied facility of this size and magnitude.
c. For each facility submit the following:

1) Name and location of facility
2) Date of Occupancy or beneficial use by Owner
3) Owner's representative to contact and telephone number
4) Construction Manager or General Contractor
5) Project Architect or Engineer
6) Provide information on the installed locations with operational equipment
7) Registration number and expiration date of RCDD professional
8) Registration number and expiration date of Level II installer.

B. Manufacturer's Qualifications: The manufacturer shall regularly and presently produce, as one of the manufacturer's principal products, the equipment and materials specified for this project, and shall have manufactured the items for at least three years.

C. Shall have a full service office within 100 miles of the Airport and be able to respond to emergency outages within 24 hours.

1.6 DELIVERY, STORAGE AND HANDLING

A. Refer to specific related specification sections for additional requirements.

1.7 RECORD DOCUMENTS

A. In addition to all general provisions of the Contract, including but not limited to, all General and Supplementary Conditions, Division 01 Specification Sections include the following project requirements:

1. Provide complete set of finalized copies of record documents prior to final acceptance of the project by the Airport and the Engineer of Record in accordance with all requirements of Division 01 specification sections. At the minimum, the record documents shall contain all information, data, and drawings as described in Chapter 1.4 "Submittals" of this specification section as well as all shop drawing requirements of related specification sections.
2. As-built documents shall be submitted in both paper and electronic media formats in the quantities as specified by Division 01 specification requirements.

    a. All electronic record drawings shall be prepared and submitted utilizing an AutoCAD- or REVIT-based program as manufactured by Autodesk. Where electronic documents are prepared using other than an AutoCAD or REVIT program manufactured by Autodesk, the contractor shall provide to The Airport, and the Engineer of Record the necessary software to electronically view the submitted documents.
    b. All electronic data sheets, control sequences, programming matrices and other descriptive data shall be provided in PDF formatted documents.
    c. Copies of all current system programming and associated software shall be provided on downloadable media formatted for the use in restoration all system operations and functionality in the event of a catastrophic failure.

1.8 OPERATION AND MAINTENANCE

A. Refer to specific related specification sections for additional requirements.

1.9 SOFTWARE AGREEMENT

A. Included as part of the scope of work for this project the Airport shall retain the ownership and access rights of ALL system programs and software associated with all systems installed and/or modified as part of this project.

1. The contractor shall provide to the Airport complete copies of all current software programming and software licenses related to the operation of each system prior to final acceptance of the related Contract scopes of work.
2. All programming shall include but not be limited to all device identifications, device descriptions, Programming Logic Matrices, all program access level passwords as well as all function and sub-function routines.
3. Programming and software copies shall be provided to the Airport on DVD digital formatted media or flash drive. In addition, the contractor shall provide a complete hard copy printout of all system programming and shall be included as part of closeout documentation for review by the Airport and the Engineer of Record.

B. Software and firmware upgrade provisions shall be included as part of this specification requirement and shall include the automatic upgrades as required to maintain all software and firmware to the manufacturers most current revision on all system components installed and or modified as part of this project for duration of the warranty period. This upgrade policy shall require the contractor to install, test, and certify all software and firmware upgrades that become available from manufacturer for a period of one year from date of final acceptance to the expiration of the warranty.

1. Upgrading of software shall include all revised/new software, labor, testing certification as well as all licenses, software and all programming.
2. These updates shall be accomplished in a timely manner, fully coordinated with the system operators, and incorporated into the operations/maintenance and software documentation manuals.

a. One (1) scheduled final update shall be provided near the end of the warranty period, at which time the Contractor shall install and validate the latest released version of the Manufacturer’s software and firmware for all systems installed and/or modified for this project.
b. All software changes shall be recorded in a log maintained in the unit control. An electronic copy of the most current software update shall be maintained within the log.

PART 2 - PRODUCTS

2.1 MANUFACTURED PRODUCTS

A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, that meet and/or exceed the

specified performance and features of the equipment and/or systems and for which replacement parts shall be readily available to the system integrator and/or using agency.

1. When more than one unit, device, or component of the same class of equipment is required, such units, devices, or components shall be the product of a single manufacturer.
2. Acceptable manufacturers for each system shall be as specified and shall be provided in full compliance with the requirements of this and all related specification sections and contract drawings.

    a. Manufacturers listed as acceptable shall not negate the contractors' responsibility for providing all equipment, devices, components, and/or systems, in accordance with all functions and performance requirements of the Contract Documents.
    b. Where manufacturer and/or manufacturer model numbers reference specific system components in the related specification sections, it is to establish the performance requirements and quality of the systems and components only.
    c. The Contractor shall provide the manufacturers' most current product that shall meet and/or exceed the specified performance and features of the equipment and/or systems.
    d. Equivalent UL- listed equipment may be substituted for the approved manufacturers unless stipulated by other Specification Sections as "No Substitutions." All substitutions shall be submitted for approval by the Airport, and the Engineer of Record in accordance with all requirements of Division 01 Specification Sections and Chapter 1.4 "Submittals" chapter of this Specification Section.

        1) Where systems and/or components are referenced as "no substitutions" the specific system and/or components shall be provided.
        2) All substitutions shall comply with all requirements as specified above and all system performance standards shall be maintained.
        3) The contractor shall stipulate the following information impacted by such a substitution.

            a) Any and all extensions in time impacted by the substitution.
            b) Any changes to the architectural or structural elements to the project
            c) Differences in operation and/or performance from intended system criteria.

        4) Failure to provide the required substitution information shall result in "without consideration" the immediate rejection of the substituted equipment and/or systems.

B. Equipment Assemblies and Components:

1. Components of an assembled unit need not be products of the same manufacturer.

    a. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.

b. Components shall be compatible with each other and with the total assembly for the intended service.
c. Constituent parts which are similar shall be the product of a single manufacturer.
d. Factory wiring shall be identified on the equipment being furnished and on all wiring diagrams.

C. Compatibility and Interoperability of System Components and Devices

1. Where multiple components, devices, and/or systems are intended to be interconnected and components of a complete system in accordance with any related specification sections, it shall be the Contractor's responsibility to verify interoperability and compatibility of said components, devices, and/or systems in full conformance to the specified performance criteria prior to the submission of shop drawings.
2. Where specified devices are found to be incompatible or incapable of performing as specified in a seamless manner, the contractor shall notify the Airport and the Engineer of Record in writing prior to submission of shop drawings. Failure to properly identify such functional discrepancies shall not relieve the contractor from providing a complete and fully functional system in accordance with the requirements of all related specification sections.

PART 3 - EXECUTION

3.1 WORK PERFORMANCE

A. Installation, final termination, testing, start-up and commissioning of all systems, system components and cabling infrastructures shall be under the direct supervision of the appropriate system integrator. The integrator shall be an accredited and authorized distributor of the appropriate equipment manufacturer and shall be fully certified in the installation, testing, commissioning, and programming of all equipment, devices, components, and/or systems being provided as part of this project.

B. Job site safety and worker safety is the responsibility of the Contractor. Ensure that safe access and egress from all work areas is maintained during movement and installation of materials. Clean up all debris generated by installation activities. Keep all communications equipment rooms free of debris at all times.

C. Pre-installation Conferences: Include provisions to attend all pre- installation conferences at Project site in compliance with all requirements in Division 01 Specification Section and as herein specified. Review methods and procedures related to installation and operations of all communications systems, including, but not limited to, the following:

1. Inspect and discuss electrical and equipment roughing-in related to all communications systems as well as other preparatory work required to be performed by other trades.
2. Review and discuss all work, equipment deliveries, installation procedures, and related scopes as required to conform to the phased construction schedule.
3. Review sequence of operations for each type of system, control, cabling and/or integration to any systems and/or equipment provided by other trades.

4. Review and finalize construction schedule and verify availability of materials, installation personnel, equipment, and any preparatory work by other trades needed to make progress and avoid delays.
5. Review required start-up, testing, commissioning, and certifying procedures to be employed for each system and any impacts to other trades.

D. For work on existing facilities, arrange, phase, and perform work to assure the operation of all communications systems for other buildings and contiguous spaces at all times. Refer to Division 01 Specification Section for additional requirements.

E. All new work shall be installed and connected to existing work neatly and carefully. Disturbed or damaged work shall be replaced or repaired to its prior conditions, as required by Division 01 Specification Section.

F. Coordinate the installation of all cabling, conduits/raceways and cable trays and equipment with applicable trades to ensure proper operation and function of all integrated systems in accordance with all related specification sections. Refer to Division 01 Specification Section for additional project coordination requirements.

G. Coordinate with all trades at the time of shop drawing submission detailing all space and/or room conditions. The contractor shall coordinate with the appropriate trade all conditions impacting the installation of any system, conduit, or cable tray including but not limited to all equipment locations, site conditions, ceilings, lighting fixtures, fire protection piping, and ductwork layouts to the satisfaction of all concerned trades, subject to final review by the Airport and the Engineer of Record.

H. The Contractor shall maintain a complete set of current and up to date set of shop drawings and equipment submissions at the job site at all times. The Shop drawings and all other submissions shall be marked up to reflect all as-built conditions and shall be made available for review by the Airport and the Engineer of Record upon request.

3.2 EQUIPMENT INSTALLATION

A. All system equipment installations shall be in accordance with good engineering practices, NEC, local building codes, and all manufacturer’s requirements. Cable terminations at all equipment locations shall comply with all state and local electrical codes. All wiring shall test free from all grounds, shorts, stray voltages, and EMI.

B. Follow manufacturers' instructions for installing, components and adjusting all equipment and cabling. Submit two (2) copies of such instructions to the Airport and the Engineer of Record before installing any equipment. Provide an additional copy of such instructions at the equipment during any work on the equipment. Where no instructions are included with the equipment, follow accepted industry practices and workmanlike installation standards.

C. All wall/floor penetrations are to be sleeved and fire stopped with approved fire stopping material or sealant as applicable for the type of penetration. Coordinate all cable and conduit penetrations of building with all affected trades. Refer to all related specification sections for additional wall/floor penetration requirements.

a. All penetrations of rated walls and floors shall be fire stopped in accordance with the ASTM and NFPA standards. Refer to related specification sections for additional requirements.
b. Floor penetrations shall be sleeved with a minimum sleeve diameter of 4 inches. An additional penetration shall be provided for future use, sleeved, and capped and fire stopped as required.
c. Coordinate size of wall penetration with conduit size, number of conductors. Comply with all NEC requirements.
d. The fire rating of all penetrated walls, floors, and ceiling structures shall be strictly maintained. All penetrations shall be fire-stopped and sealed by the Contractor.
e. Install fire-stopping in open penetrations and in the annular space of penetrations for fire rated barriers.
f. Installation of fire-stops shall be performed by an applicator/installer qualified and trained by the manufacturer. Installation shall be performed in strict accordance with manufacturer's detailed installation procedures.
g. Installation of all fire-stopping shall be in accordance with fire test reports, fire resistance requirements, acceptable sample installations, manufacturer's recommendations, local fire and building authorities, and applicable codes and shall be installed in a manner acceptable to the authority having jurisdiction.

3.3 ELECTRICAL POWER DISTRIBUTION

A. All 120/208VAC emergency electrical power shall be provided by this Contractor from the nearest emergency distribution panel as required for the proper operation of all communications systems, devices and/or components.

B. Coordinate with the Division 26 contractor prior to connections and/or modifications to the electrical distribution panels. Additional locations requiring electrical power by the specific products and/or integrator selected equipment shall be the responsibility of this Contractor to include as part of this project.

3.4 TRANSIENT VOLTAGE SUPPRESSION

A. Transient Voltage Surge Suppression: All cables and conductors extending beyond building façade, except nonconductive fiber optic cables, which serve as communications, control, or signaling circuits shall be protected against Transient Voltage surges and have Transient Voltage Surge Suppression (TVSS) protection.

1. The TVSS device shall be UL listed in accordance with Standard TIA 497B installed at each end. Lighting and surge suppression shall be a multi-strike variety and include a fault indicator.
2. Protection shall be furnished at the equipment and additional triple solid state surge protectors rated for the application on each wire line circuit shall be installed within 914.4 mm (3 ft) of the building cable entrance. Fuses shall not be acceptable for surge protection applications. All inputs and outputs shall be tested in both normal mode and common mode to verify there is no interference at the minimum surge suppression test shall meet the following criteria.

a. All system power supplies serving exterior system components or devices shall be provided with the appropriate transient surge suppression protection on both the line side as well as the load side.

1) A 10-microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 volts and a peak current of 60 amperes shall be the minimum performance requirements. Provide surge suppression in accordance with all manufacturers requirements.
2) An 8-microsecond rise time by 20-microsecond pulse width waveform with a peak voltage of 1000 volts and a peak current of 500 amperes shall be the minimum performance requirements. Provide surge suppression in accordance with all manufacturers requirements.
3) Maximum series current: 2 AMPS. Provide units manufactured by Advanced Protection Technologies, model # TE/FA 10B or TE/FA 20B or approved equal.
4) Operating Temperature and Humidity: -40 to 85 degrees C (-40 to 185 degrees) shall be the minimum performance requirements. Provide surge suppression in accordance with all manufacturers requirements.

3.5 GROUNDING AND BONDING

A. All electronic equipment, conduits, cable trays, racks/cabinets and cable shields shall be properly grounded and bonded in accordance with all requirements of EIA/TIA 607-A, NEC 250 and IEEE 1100. Where identified as applicable to the project, all equipment grounding and bonding shall be in accordance with all related specification sections and Motorola R56 Standards and Guidelines for Communications Sites.

1. A Telecommunications Grounding System shall be installed in all communications equipment rooms. Grounding system shall provide equalization of the grounding potentials between the building power system and the telecommunications main grounding bus-bar (TMGB) as well as all telecommunications grounding bus-bars (TGB). Grounding bus-bar shall provide the diversion of electrical transients from the telecommunications cables and to provide a safety ground for all equipment racks/cabinets, conduits, cable trays and cable shields as well as providing the required coupling to cancel and/or reduce transients.
2. All grounding connections shall provide the equalization of all grounding potentials between the building power system and the grounding terminations at the communications equipment in order to provide the diversion of electrical transients as well as providing the necessary coupling in order to cancel and/or reduce any voltage transients.
3. Refer to related specification sections for any additional grounding and bonding requirements.

3.6 MAINTENANCE & SERVICE

A. General Requirements

1. The Contractor shall provide all services required and equipment necessary to maintain the all communications systems associated with this project in fully operational state as specified after formal written acceptance of the system.

a. Provide all necessary material required for performing scheduled adjustments or other non-scheduled work. Impacts on facility operations shall be minimized when performing scheduled adjustments or other non-scheduled work. Refer to Division 01 specification section for additional requirements.
b. The adjustment and repair of the communications systems shall include all software and firmware up-dates on all computers, CPU's, HMI terminals, devices, communications and data transmission medias' (DTM), facility interface processors, signal transmission equipment and processors.

B. Personnel

1. Service personnel shall be manufacturer certified in the maintenance, testing, and repair of the type of system and equipment provided for the project. Provide the Airport and the Engineer of Record the name of the designated service representative, and of any change in personnel.

a. The Airport and the Engineer of Record shall be provided copies of system manufacturer certifications for all designated service representatives.

2. Schedule of all work to be performed during regular working hours, Monday through Friday, excluding federal holidays.

C. Emergency Service

1. The Airport shall initiate service calls whenever the system is not functioning properly. The Contractor shall provide the Airport with an emergency service center telephone number. The emergency service center shall be staffed 24 hours a day 365 days a year. The Airport shall have sole authority for determining catastrophic and non-catastrophic system failures.

a. For catastrophic system failures, the Contractor shall provide same day eight (8) hour service response with a defect correction time not to exceed sixteen (16) hours from arrival on site. Catastrophic system failures are defined as any system failure that the Airport determines will place the facility(s) at increased risk.
b. For non-catastrophic failures, the Contractor within 1 business day with a defect correction time not to exceed 48 hours from time of notification.

D. The contractor shall, at the owner request, make available a service contract offering continuing factory authorized service of this system after the initial warranty period. This service contract shall be for one year with a three-year contract renewable each year after the expiration of the initial contract.

E. Records & Logs

1. The Contractor shall maintain records and logs of each task and organize cumulative records for each component and for the complete system chronologically. A continuous log shall be submitted for all devices. The log shall contain all initial settings, calibration, repair, and programming data. Complete logs

shall be maintained and available for inspection on site, demonstrating planned and systematic adjustments and repairs have been accomplished for the system.

F. Work Request

1. The Contractor shall separately record each service call request, as received. The record shall include the serial number identifying the component involved, its location, date and time the call was received, specific nature of trouble, names of service personnel assigned to the task, instructions describing the action taken, the amount and nature of the materials used, and the date and time of commencement and completion.
2. The Contractor shall deliver a record of the work performed within five (5) working days after the work was completed.

G. System Modifications

1. The Contractor shall make any recommendations for system modification in writing to the Airport and the Engineer of Record. No system modifications, including operating parameters and control settings, shall be made without prior written approval from the Airport. Any modifications made to the system shall be incorporated into the operation and maintenance manuals and all related documentation.

3.7 WARRANTY

A. Warrant material and workmanship for a period as specified in Division 01 of the contract documents and all related specification sections. The warranty period shall commence from the date the Contactor received written notification of final acceptance from the Authority's Representative. At the minimum, the contractor shall provide warranty provisions:

1. Warrant the replacement of defective components/materials and/or correct defective work when given notice by the Airport and the Engineer of Record during the warranty period.

   a. At no time is the contractor to use the extra materials provided under the scope of this project to replace malfunctioning or damaged equipment and or components. The Contractor shall replace all malfunctioning or damaged equipment and or components with new. The repair and then reinstallation of malfunctioning or damaged equipment shall not be acceptable.

2. Warranty excludes liability for consequential incidental, or special damages due to vandalism, misuse, or acts of god.
3. Onsite warranty response time by qualified technician shall be within 24 hours upon receipt of request from Airport.
4. Warranty repairs shall be provided to the Authority at no cost. This shall include but not limited to replacement of all defective components/materials, all labor charges, all travel costs and all vehicle charges.
5. Response time shall be 7 days a week / 24 hours a day / 365 days a Year.
6. Provide test, inspection, and service of each system on a semi-annual basis at six month intervals.

7. Contractor must provide verification that they maintain their principle base of operation along with the personnel that will be responsible for providing service within 3 hours driving time to the project site. This tenet of the warranty shall remain in effect for the life of the warranty.
8. All TCP/IP-based communications systems cabling and related appurtenances shall be provided with the manufacturer's 25-year extended warranty in addition to all requirements above.

B. The Contractor shall, as a condition of final payment, execute a written warranty certifying all contract requirements have been completed according to all requirements of the Contract Documents.

1. All system testing, commissioning, demonstration and training shall be performed prior to final system acceptance. All defects or damages due to faulty materials or workmanship shall be replaced without delay, to the satisfaction of the Airport and Engineer of Record, at the Contractor's expense.

a. The contractor shall provide written documentation of test results and stating what was done to correct any deficiencies. The first inspection shall occur 90 calendar days after the acceptance date. The last inspection shall occur 30 calendar days prior to the end of the warranty.
b. The warranty period shall be extended until the last inspection and associated corrective actions are complete. Where any equipment and/or labor covered by Contractor's or manufacturer's warranty, has been replaced, due to failure, the warranty period for any replaced equipment or restored work shall be reinstated for a period equal to the original warranty period, and commencing with the date of completion of the replacement or restoration work.

2. In the event any manufacturer customarily provides a warranty period greater than one (1) year, the Contractor's warranty shall be for the same duration for that component.

3.8 FIELD SERVICES

A. In addition to all testing requirements as specified by Division 01 specification section and all related Division 27 Specification Section, testing of all systems, sub-systems and cabling infrastructures shall be provided in accordance with all requirements of this section.

B. Notify the Airport and the Engineer of Record in writing, prior to the closing of any ceilings and ten (10) days advance of testing all system cabling to prevent delays in construction schedules.

1. Test all cabling to confirm that no grounds, shorts, sneak currents, RFI and EMI conditions exist prior to start-up and commissioning of all, components, devices, equipment and/or systems.

a. Before requesting a final inspection, the contractor shall perform a series of end to end installation performance tests. The contractor shall submit for

approval by the Airport and the Engineer of Record all test procedures to be employed, test result forms, and timetable for testing all fiber optic and UTP structured copper wiring.

b. Acceptance of the simple test procedures discussed below is predicated on the contractor's use of the recommended products including but not limited to, fiber optic cable, category structured cable, cross-connect blocks, patch panels, and outlet devices specified and adherence to the inspection requirements and practices set forth. Acceptance of the completed installation will be evaluated in the context of each of these factors.

C. General

1. Test Plan/Procedure: The Contractor shall provide six (6) hardcopies and an electronic copy of the test plan/procedures for each testing phase for the review and approval of the Airport and the Engineer of Record. The test plan for each phase shall detail the objectives of all tests. The tests shall clearly demonstrate that the system and its components fully comply with the requirements specified herein. The test plan shall be provided at least forty-five (45) days prior to the scheduled start of each test. Test plans shall contain at a minimum:

a. Functional procedures including use of any test equipment
b. Test equipment is to be identified by manufacturer and model
c. Interconnection of test equipment and steps of operation shall be defined
d. Test records shall include test equipment serial number, calibration date and calibration certification of test equipment
e. Expected results required to comply with specifications
f. Traceability matrix referencing specification requirements with specific test procedures
g. Record of test results with witness initials or signature and date performed
h. Pass or fail evaluation with comments.
i. The test procedures shall provide conformity to all specification requirements. Satisfactory completion of the test procedure is necessary as a condition of system acceptance.
j. The Contractor's Quality Assurance organization shall review all formal test procedures prepared by the Contractor and deliverable under the contract to assure the tests cover all requirements and that there is a conformity between the conducted test, the test results and specification requirements.
k. Documentation verification, both interconnects and functionality shall be part of the test. Where documentation is not in accordance with the installed system interconnect and operating procedures, the system shall not be considered accepted until the system and documentation correlate.
l. All testing must be witnessed by the Airport and the Engineer of Record. The Contractor shall cooperate fully in this regard.
m. Test Reports: The Contractor shall prepare, for each test, a test report document that shall certify successful completion of that test. Six (6) hardcopies and one electronic version of the test report shall be submitted to the Airport and the Engineer of Record for review and acceptance within seven (7) days following each test. The test report shall contain, at a minimum:

1) Commentary on test results.

2) A listing and discussion of all discrepancies between expected and actual results and of all failures encountered during the test and their resolution.
3) Complete copy of test procedures and test data sheets with annotations showing dates, times, initials, and any other annotations entered during execution of the test.
4) Signatures of persons who performed and witnessed the test.

2. Test Resolution: Any discrepancies or problems discovered during these tests shall be corrected by the Contractor at no cost to the Airport and the Engineer of Record. The problems identified in each phase shall be corrected and the percentage of the entire system re-tested determined by the Airport and the Engineer of Record, before any subsequent testing phase is performed.

B. Performance Verification Testing

1. Complete operational testing of all components and systems shall be witnessed by the Engineer.
2. Schedule test with the Airport and the Engineer of Record. Do not begin testing until:

a. All systems have been installed and individually and jointly tested to ensure they are operating properly.
b. Written permission from the Airport and the Engineer of Record has been received.

3. Testing: As part of performance verification, test all components of system. The tests shall demonstrate system features.
4. Verification: Verify correct operation of the required system functionality as defined in these specifications.

5. Adjustment, Correction, and Completion:

a. Correct deficiencies and retest affected components.
b. Make necessary adjustments and modification to system after obtaining approval of the Authority or authorized representative.
c. Completion: Performance verification test shall be complete when testing or retesting of each component has produced a positive result and has been approved in writing by the Authority or authorized representative.

6. Recording:

a. Describe actual operational tests performed and equipment used and list personnel performing tests.
b. Record in tabular form all test results, deficiencies, and corrective measures.

7. Termination

a. Performance verification test shall be terminated by the Airport and the Engineer of Record when:

1) Individual systems, system components, subsystems, or cabling infrastructure fail to perform as specified.
2) It is determined that a system or sub-system is missing any components or installation is not complete.

b. Upon termination, corrective work shall be performed and performance verification test rescheduled with the Airport and the Engineer of Record.
c. Retesting shall be performed by Contractor at no additional expense.
d. Contractor shall continue to perform corrective actions and retest until system passes all tests to satisfaction of the Airport and the Engineer of Record.

C. Final Inspection and Acceptance

1. The Contractor will not be responsible for failures caused by:

a. Outage of main power in excess of backup power capability provided that automatic initiation of all backup sources was accomplished and automatic shutdowns and restarts of systems performed as specified.
b. Failure of any Airport furnished power, communications, and control circuits provided failure was not due to Contractor furnished equipment, installation, or software.
c. Failure of existing Airport equipment provided failure was not due to Contractor furnished equipment, installation, or software.

2. When performance of integrated system does not fall within the above rates, determine cause of deficiencies, correct, and retest.

a. When requested by the Airport and the Engineer of Record, extend monitoring period for a time as designated by the Authority or authorized representative.
b. Submit final report of endurance testing containing all recorded data.

3. The Contractor shall submit written certification that:

a. The Contract Documents have been reviewed.
b. All required as-built documentation has been submitted and approved by the Airport and the Engineer of Record.
c. The Project had been inspected for compliance with the Contract Documents.
d. The Work has been completed in accordance with the Contract Documents.
e. The equipment and systems have been tested and are shown operational in the presence of the Airport and the Engineer of Record.
f. The Project is completed and is ready for final inspection.

3.9 PROJECT CLOSEOUT REQUIREMENTS

A. In addition to all final close requirements as specified by Division 01, Specification Section 270500 Specification Section, the Contractor shall provide all requirements of this Section.

B. Final System Acceptance

1. In addition to the requirements set forth in Division 01, the Contractor shall prepare and issue a Certificate of Project Completion, containing:

   a. The date of project completion.
   b. A list of items that have been corrected by the Contractor.
   c. The time and date the Airport will assume possession of the system (transfer of ownership).
   d. The date that warranty begins.

2. The Airport and the Engineer of Record will perform an inspection after receipt of written certification. The project completion inspection shall include, but not be limited to:

   a. The project's contracted work and any additional change orders.
   b. All equipment and systems tested and shown operational in the presence of the Airport and the Engineer of Record.

3. After the inspection the Airport and the Engineer of Record will prepare and submit to the Contractor, a list of items to be completed or corrected, as determined by the inspection, along with the designated timeframe for completion.

4. Should the Airport or Engineer of Record consider the work not to be complete, the Airport or Engineer of Record will immediately notify the Contractor, in writing, stating the reasons. The Contractor shall complete the work, and then send a second written notice to the Airport and the Engineer of Record certifying that the Project is complete. The Airport and the Engineer of Record shall then re-inspect the work upon Contractor's request at a scheduled re-inspection time.

5. At any time, the Authority shall have the right to Contract with a third party in order to complete and/or inspect any work of which Contractor failed to conform with the Contract requirements. All cost for this third party shall be borne by the original Contractor responsible for delivering the project.

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SECTION 270528 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

A. This includes specifications for the installation of conduits, cable tray, back boxes, junction boxes, and sleeves (pathways) for communications systems.

B. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to the work of this section.

1.2 RELATED SECTIONS

A. All Division 27 specifications

1.3 REFERENCES

A. Conflicts:

1. Between referenced requirements: Comply with the one establishing the more stringent requirements.
2. Between referenced requirements and contract documents: Comply with the one establishing the more stringent requirements.

B. Telecommunications Industry Association/Electronic Industries Association (TIA/EIA):

1. 569A Commercial Building Standard for Telecommunications Pathways and Spaces

C. Building Industry Consulting Services International (BICSI):

1. Telecommunications Distribution Methods Manual (TDMM)

D. Federal Supply Service, General Services Administration Q-A-601F

E. ANSI C80.3 – Electrical Metallic Tubing, Zinc Coated.

F. American Society for Testing and Materials (ASTM):

1. ASTM E 84 Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E 119 Method of Fire Tests of Building Construction and Materials
3. ASTM E 814 Test Method for Fire Tests of Through Penetration Firestops.

G. Underwriters Laboratory, Inc. (UL)

1. UL Building Materials Directory

2. UL Fire Resistance Directory

3. UL 2079 Test.

H. National Electrical Manufacturers Association (NEMA) 250

1.4 SUBMITTALS

A. Submit plan and section drawings detailing proposed pathway routing and seismic bracing prior to any installation.

B. Product Data: For each type of cable tray.

1. Include data indicating dimensions and finishes for each type of cable tray indicated. Submit catalog cut sheets of pathways and associated hardware prior to any installation.

C. Shop Drawings: For each type of cable tray

1. Show fabrication and installation details of cable trays, including plans, elevations, and sections of components and attachments to other construction elements. Designate components and accessories, including clamps, brackets, hanger rods, splice-plate connectors, expansion-joint assemblies, straight lengths, and fittings.

D. Test Reports: Submit certified test reports indicating compliance with material reference standard indicated for material performance characteristics and physical properties of fire stopping materials

E. Certificates: Submit product certificates, signed by manufacturer certifying materials comply with specified performance characteristics and physical properties of fire stopping materials.

F. Submit certificates stating that the contractor is certified to properly install all firestopping materials.

1.5 QUALITY ASSURANCE

A. Verify conduit runs do not interfere with existing or new systems within each facility.

B. Follow Appendix B of NEC.

C. The Cable Tray Installer shall be certified by the manufacturer on all cable tray components and installations utilized in this project.

D. Fire stopping: Manufacturer trained and approved installer to perform fire stopping work who has specialized in the installation of work similar to that required for this project.

PART 2 – PRODUCTS

2.1 GENERAL

A. All conduits shall be UL listed and so labeled.

B. Cable Trays and Accessories: Identified as defined in NFPA 70 and marked for intended location, application, and grounding.

1. Source Limitations: Obtain cable trays and components from a single manufacturer.
2. Structural Performance: See articles for individual cable tray types for specific values for the following parameters:

a. Uniform Load Distribution: Capable of supporting a uniformly distributed load on the indicated support span when supported as a simple span and tested according to NEMA VE 1.
b. Concentrated Load: A load applied at midpoint of span and centerline of tray.
c. Load and Safety Factors: Applicable to both side rails and rung capacities.

C. Where conduit and other raceway sizes are not specifically shown on the plans, conduits and trays shall be sized in accordance with the requirements of the Florida Building Code, BICSI and the NEC. No conduit shall be less than 1 inch.

D. Raceways installed in stud walls or above suspended ceilings shall be Electrical Metallic Tubing. PVC conduit shall not be used.

2.2 CONDUITS AND ACCESSORIES

A. Electrical metallic tubing (EMT) shall be as manufactured by Allied, Triangle, Republic, or approved equal, in accordance with UL 797 and ANSI C80.3. EMT shall be high-strength, zinc-coated, 1 inch minimum size. EMT shall not be utilized for service entrance conductors. Fittings shall be of same finish and material as tubing. Fittings shall be screw in type or approved equivalent.

B. Expansion Joint Fittings: OZ type AX, Appleton type XJB, or approved equal, watertight, permitting two-way movement up to 4 inches, equipped with bonding jumpers around or through each fitting.

C. Thruwall Sealing Fittings: Type WSK by O-Z Gedney Company, or approved equal.

D. Fire-Seal Fittings: Type CFSI by O-Z Gedney Company, or approved equal.

E. Sealing Material for Sealing Fittings: Chico X Fiberdam, and Chico A sealing compound, or Chico A-P interpak by Crouse-Hinds or Apelco sealing cement and fiber filler by Appleton, or approved equal.

F. Insulated Bushings: Type B or SBT, as applicable, by O-Z Gedney or series B1900, series BU500 or series TC700, as applicable, by Steel City, or approved equal.

G. Pulling in Wire: Provide a 1200# nylon pull rope or mule tape in each empty conduit or innerduct.

H. Thread lubricant/sealant shall be Crouse-Hinds type STL or T & B Kopr-Shield except, when required on joints for heat producing elements such as lighting fixtures, it shall be Crouse-Hinds type HTL, or approved equal.

I. Wireways and wiring troughs shall be code gauge galvanized steel, sized as shown, or as required by the NEC. Covers shall be screwed. Where indicated as rain tight, wire ways shall be galvanized and shall comply with the NEMA requirements.

2.3 JUNCTIONS BOXES AND PULL BOXES

A. All pull boxes shall be constructed of 14 or 12 gauge galvanized steel with an ANSI 61 grey polyester powder finish inside and out unless otherwise specified.

B. All pull boxes shall have flat, removable covers fastened with plated steel screws with unique keyhole screw slots in the cover to permit removal of the cover without extracting screws.

C. All pull boxes shall provide the appropriate provisioning for grounding.

D. All pull boxes shall be NEMA Type 1 and sized according to the table below unless otherwise specified:

Maximum Trade Size of Conduit (inches)	Minimum Box Size (inches)			For Each Additional Conduit Increase Width (Inches)
	Width	Length	Depth	
1	4	16	3	2
1.25	6	20	3	3
1.5	8	27	4	4
2	8	36	4	5
2.5	10	42	5	6
3	12	48	5	6
3.5	12	54	6	6
4	15	60	8	8

2.4 INNERDUCT

A. Any fiber optic cable not in its own dedicated conduit pathway shall be either armored cable or installed within innerduct.

B. Any innerduct placed in space used as an air return or in any way connected with air handling plenums or building ventilation shall be low-smoke, fire retarding innerduct, and must comply with the National Electrical Code Articles 725, 760, and 800. No cabling or innerduct shall be placed in plenums without written approval from the Owner.

C. Where multiple innerducts are placed in the same raceway, each innerduct shall be labeled per Division 27 specifications.

D. Innerduct: Extruded, smooth wall, coilable tubing suitable for installation within an existing larger diameter conduit system. Innerduct shall be orange when only one innerduct is installed. Multiple innerducts in a single conduit shall be easily differentiable colors (blue, orange, green, and brown). Innerduct to be used in interior applications shall be plenum rated, manufactured from PVC and may have silicone impregnated interior surface. Outdoor innerduct can be either PVC or HDPE. Innerduct shall be 1" smooth-wall, inner diameter, with four innerducts installed in every 4" PVC conduit as detailed in the plan drawings.

E. Each and every innerduct end will be capped with a correctly sized, application specific, duct plug/end cap. All spare innerducts shall have a pull string (length of pull determines string strength) installed for future use and be provided with duct plugs/end caps sized for the innerduct with an integral pull string tie-off. Couplings shall be non-metallic schedule 40. For any length of innerduct longer than 200 feet, a 1200-pound pull rope is required, shorter than 200-foot lengths can use a 200-pound pull string.

2.5 LADDER CABLE TRAYS

A. Manufacturers:

1. Chatsworth Products, Inc. (CPI), UL Classified Cable Runway
2. Approved Equal

B. Description

1. Rung Spacing: 9 inches on center
2. Radius-Fitting Rung Spacing: 9 inches at center of tray's width
3. Minimum Cable-Bearing Surface for Rungs: 7/8-inch width with radius edges
4. No portion of the rungs shall protrude below the bottom plane of side rails
5. Structural performance of each rung: Capable of supporting a maximum cable load with a safety factor of 1.5, plus a 200-lb concentrated load, when tested according to NEMA VE 1.
6. Straight Section Lengths: 10 feet (3m) except where shorter lengths are required to facilitate tray assembly.
7. Cable tray size as shown on the floor plans.
8. Fitting Minimum Radius: 24 inches.
9. Class Designation: Comply with NEMA VE 1, Class 12B, Class 12C.
10. Splicing Assemblies: Bolted type using serrated flange lock nuts.
11. Hardware and fasteners: Metal suitable for indoors, and protected against corrosion by electroplated zinc galvanizing, complying with ASTM B 633, Type I, not less than 0.000472 inches (0.012 mm) thick.
12. Splice Plate Capacity: Splices located within support span shall not diminish rated loading capacity of cable tray.
13. Provide cable runaway radius drop (waterfall) at cable transitions from tray to racks.
14. Provide grounding clamps and #6AWG ground wire connecting to the telecommunications grounding system.
15. Finish: Powder-coat enamel paint.

a. Powder-coat Enamel: Cable tray manufacturer's recommended primer and corrosion-inhibiting treatment, with factory applied powder-coat paint.
b. Hardware: Chromium-zinc plated, ASTM F 1136.
c. Finish color: Black

2.6 WIRE-BASKET CABLE TRAYS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:

1. WBT
2. Approved equal

B. Description:

1. Configuration: Wires are formed into a standard 2-by-4-inch (50-by-100-mm) wire mesh pattern with intersecting wires welded together. Mesh sections must have at least one bottom longitudinal wire along entire length of section.
2. Materials: High-strength-steel longitudinal wires with no bends.
3. Safety Provisions: Wire ends along wire-basket sides (flanges) rounded during manufacturing to maintain integrity of cables and installer safety.
4. Sizes:

    a. Straight sections shall be furnished in standard 118-inch (3000-mm) lengths.
    b. Cable tray size as shown on the floor plans.

5. Connector Assemblies: Bolt welded to plate shaped to fit around adjoining tray wires and mating plate. Mechanically joins adjacent tray wires to splice sections together or to create horizontal fittings.
6. Connector Assembly Capacity: Splices located within support span shall not diminish rated loading capacity of cable tray.
7. Hardware and Fasteners: Metal suitable for indoors, and protected against corrosion by electroplated zinc galvanizing, complying with ASTM B 633, Type 1, not less than 0.000472 inches (0.012 mm) thick.
8. Provide all fittings and accessories required to protect, support and install a ladder rack support system.
9. Provide grounding clamps and #6 AWG ground wire.
10. Finish: Electrogalvanized before fabrication.

    a. Standard: Comply with ASTM B 633.
    b. Hardware: Galvanized, ASTM B 633.

2.7 CABLE TRAY ACCESSORIES

A. Fittings: Tees, crosses, risers, elbows, and other fittings as indicated, of same materials and finishes as cable tray.

B. Covers: Solid type made of same materials and with same finishes as cable tray. Refer to floor plans for locations where covers are used.

C. Barrier Strips: Same materials and finishes as for cable tray.

1. Cable tray supports and connectors, including bonding jumpers, as recommended by cable tray manufacturer.

D. Finish: Black oxide finish for support accessories and miscellaneous hardware according to ASTMD769.

2.8 FIRESTOPPING AND MATERIALS

A. All Manufacturers:

1. Johns Manville
2. Hilti
3. Nelson
4. Or approved equal

B. Description

1. Performance requirements: Provide fire stopping systems that are produced and installed to resist spread of fire according to requirement indicated, resist passage of smoke and other gases, and maintain fire resistance rating of assembly.

   a. F-Rated Systems: in accordance with ASTM E 814
   b. T-Rated Systems: in accordance with ASTM E 814

2. Fire stopping flame spread performance requirements: Provide products with flame-spread ratings of less than 25 and smoke development ratings of less than 50 as determined in accordance with ASTM E 84.
3. Fire Stopping UL performance requirements: Provide products with UL ratings specified for assembly indicated as determined in accordance with UL listings.

PART 3 – EXECUTION

3.1 GENERAL

A. Raceways shall be mechanically and electrically connected to all boxes and fittings and shall be properly grounded.

B. All pathways shall be installed in such a fashion that the installation meets or exceeds all local seismic requirements.

C. The routing and location of all conduits and other raceways shall be coordinated with other trades and with the building construction to avoid conflicts.

D. Where raceways pass through walls, partitions and floors, seal penetrations to provide a neat installation which will maintain the integrity of the waterproofing or fireproofing, as applicable, of the structure. Coordinate installation requirements with roofing installer where conduits pass through the roof.

E. All raceways entering a building from underground shall be sealed to prevent water, moisture, gas, or any other foreign matter from entering the building. Service conduits shall be sealed in accordance with NEC 230-8.

3.2 CONDUIT INSTALLATION

A. EMT - Provide insulated throat, non-indenter, set screw, malleable steel fittings. Screws must have a full set. All EMT fittings shall be fabricated from steel. Die-cast fittings or fittings made from pot metal shall not be allowed. Indenter type fittings are not acceptable. Install OZ type B bushings on conduits 1" and larger. Where conduits terminate in thread less opening, locknuts shall be provided both inside and outside of the box or enclosure and the conduit end shall be fitted with an insulating bushing. Where bonding is required, the end of the conduit shall be equipped with an insulated metallic grounding and bonding bushing.

B. All metallic couplings, connectors and fittings shall be malleable iron or steel and finished with zinc plating or by galvanizing.

C. All conduits shall be plugged after installation to prevent the entrance of construction dirt and debris. Conduits shall be cleaned before wires are pulled.

D. Expansion fittings shall be utilized in all cases where conduits pass through building expansion joints. Fittings shall be of an approved weatherproof telescopic type permitting a movement of up to four inches and shall be provided with approved bonding jumpers around or through the fitting.

E. All conduits shall be properly supported using galvanized malleable iron conduit clamps for individual runs. Multiple runs shall be supported on channel adequately secured to walls or hung from structure above with conduits fastened to channel with clamps designed for the purpose.

F. Connection of Conduit to Sheet Metal Boxes and Enclosures:
1. Connection to NEMA 1 type boxes and enclosures: EMT- Install compression box connectors with insulated throats.
2. Connection to NEMA 3R, 4, 4X, and 12 type boxes: Install insulated bushings and sealing locknuts or hubs.
3. When conduits enter floor mounted enclosures from below and there is no sheet metal to which to attach; install grounding bushings on the conduit. Bond bushings to ground bus using a conductor the same size as required for an equipment grounding conductor sized for the given circuit.
4. Install sealing bushing within all conduits which have entered a building from outside, whether from above or below grade.

G. Verify all pathways are installed in accordance with Local Seismic requirements.

3.3 COMMUNICATIONS CONDUIT INSTALLATION

A. No section of conduit shall be longer than 30m (100 ft.) or contain more than two 90 degrees bends between pull points or pull boxes.

B. The inside radius of a bend in a 2 inch or smaller conduit shall be at least 6 times the internal diameter. For all conduit larger than 2 inches the inside radius of a bend in the conduit shall be at least 10 times the internal diameter of the conduit.

C. A fish tape or measured pull cord shall be placed in installed conduit.

D. All communications conduits shall be color coded with orange tape marked “communications” and labeled with the location of the conduits beginning and ending points. Labeling shall occur at the beginning and ending points and every 50 feet where conduit is exposed.

E. Conduit shall be reamed to eliminate sharp edges and terminated with an insulated bushing.

F. Conduit protruding through the floor shall be terminated 4 inches above the floor surface.

G. Pull or splice boxes shall be placed in an exposed manner and location, and readily accessible.

H. A color-coded pull or splice box shall be placed in a conduit run where the length is over 30 m (100 ft.), there are more than two 90 degree bends, or there is a reverse bend in the run.

I. All conduit and cabinet entrances shall be sealed with an approved, re-enter able sealant material to prevent ingress of water, dust or other foreign materials.

3.4 JUNCTION BOX AND PULL BOX INSTALLATION

A. Pull boxes shall be installed in sections of conduit that 100 feet or more in length, that contain more than two 90 degree bends, or that contain bends that are 180 degrees or more in the aggregate.

B. A pull box shall not be used in lieu of a conduit bend.

C. All pull boxes shall be installed in an easily accessible location with unobstructed entry to the pull box access panel.

D. Pull boxes shall be supported on all four corners in such a manner that the pull box is not supported by the cable running through or conduit attached to the pull box.

E. Verify all pull boxes are installed in accordance with Local Seismic requirements.

3.5 CABLE TRAY INSTALLATION

A. Install cable trays according to NEMA VE 2.

B. Install cable trays as a complete system, including fasteners, hold-down clips, support systems, barrier strips, adjustable horizontal and vertical splice plates, elbows, reducers, tees, crosses, cable dropouts, adapters, covers, and bonding.

C. Install cable trays so that the tray is accessible for cable installation and all splices are accessible for inspection and adjustment.

D. Remove burrs and sharp edges from cable trays.

E. Join aluminum cable tray with splice plates; use four square neck-carriage bolts and locknuts.

F. Fasten cable tray supports to building structure and install seismic restraints.

G. Design fasteners and supports to carry cable tray, the cables, and a concentrated load of 200 lb. (90 kg).

H. Place supports so that spans do not exceed maximum spans on schedules and provide clearances shown on Drawings. Install intermediate supports when cable weight exceeds the load-carrying capacity of the tray rungs.

I. Construct supports from channel members, threaded rods, and other appurtenances furnished by cable tray manufacturer. Arrange supports in trapeze or wall-bracket form as required by application.

J. Support bus assembly to prevent twisting from eccentric loading.

K. Install center-hung supports for single-rail trays designed for 60 versus 40 percent eccentric loading condition, with a safety factor of 3.

L. Locate and install supports according to NEMA VE 2. Do not install more than one cable tray splice between supports.

M. Support wire-basket cable trays with trapeze hangers.

N. Support trapeze hangers for wire-basket trays with 3/8-inch diameter rods.

O. Make connections to equipment with flanged fittings fastened to cable trays and to equipment. Support cable trays independent of fittings. Do not carry weight of cable trays on equipment enclosure.

P. Install expansion connectors where cable trays cross building expansion joints and in cable tray runs that exceed dimensions recommended in NEMA VE 2. Space connectors and set gaps according to applicable standard.

Q. Make changes in direction and elevation using manufacturer's recommended fittings.

R. Make cable tray connections using manufacturer's recommended fittings.

S. Seal penetrations through fire and smoke barriers.

T. Install capped metal sleeves for future cables through firestop-sealed cable tray penetrations of fire and smoke barriers.

U. Install cable trays with enough workspace to permit access for installing cables.

V. Install warning signs in visible locations on or near cable trays after cable tray installation.

3.6 CABLE TRAY GROUNDING

A. Ground cable trays according to NFPA 70 unless additional grounding is specified.

B. Cable trays with communications cable shall be bonded together with splice plates listed for grounding purposes or with listed bonding jumpers.

C. Cable trays with control conductors shall be bonded together with splice plates listed for grounding purposes or with listed bonding jumpers.

D. When using epoxy or powder-coat painted cable trays as a grounding conductor, completely remove coating at all splice contact points or ground connector attachment. After completing splice-to-grounding bolt attachment, repair the coated surfaces with coating materials recommended by cable tray manufacturer.

E. Remove paint from all connection points before making connections. Repair paint after the connections are completed

3.7 FIRESTOPPING MATERIALS INSTALLATION

A. Compliance: Comply with manufacturer’s product data, including product technical bulletins, product catalog installation instruction, and product carton instruction for installation.

B. Site Verification of Conditions: Verify substrate conditions are acceptable for product installation in accordance with manufacturer’s instructions.

C. Installation: Install fire stopping to comply with performance requirements specified herein.

D. Install fire stopping to comply with listed fire rated assemblies in accordance with ASTM and UL requirements

E. Installer shall be trained and approved by the manufacturer

F. Protection: Protect installed products from damage during construction operations until final completions.

G. Inspection: Code official or building inspectors to review proper installation using manufacturer guidelines.

3.8 FIELD QUALITY CONTROL

A. Perform the following inspections:

1. Visually inspect pathway installations for damage. Correct sharp corners, protuberances in trays, vibrations, and thermal expansion/contraction conditions which may cause or have caused damage.
2. Verify that communications cabling are installed in separate pathways from electrical power cabling.
3. Verify that there are no intruding items such as pipes, hangers, or other equipment in the pathways.
4. Remove dust deposits, industrial process materials, trash of any description, and any blockages.
5. Visually inspect each cable tray joint and each ground connection for mechanical continuity. Check bolted connections between sections for corrosion. Clean and re-torque any suspect areas.
6. Check for missing, incorrect, or damaged bolts, bolt heads, or nuts. When found, replace with specified hardware.
7. Perform visual and mechanical checks for adequacy of cable tray grounding.

END OF SECTION 270528

SECTION 270554 - IDENTIFICATIONS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. All other Division 27 Specifications.

1.2 SUMMARY

A. Section Includes the identification requirements for the following:

1. Communications Rooms
2. Backbone cabling
3. Horizontal cabling
4. Cabinet/Racks
5. Patch Panels
6. Communications Conduit
7. Maintenance/Hand Hole Covers

1.3 DEFINITIONS

A. AWG - American Wire Gauge

B. Mbps - Megabits Per Second

C. PVC - Polyvinyl Chloride

D. ANSI - American National Standards Institute

E. ASTM - American Society for Testing Materials

F. BICSI - Building Industry Consulting Services International

G. RCDD – Registered Communications Distribution Designer

H. EIA - Electronics Industries Association

I. SCS – Structured Cabling System

J. TIA - Telecommunications Industry Association

K. TSB - Technical Systems Bulletin

L. UL - Underwriter's Laboratories

M. MCR – Main Communications Room

N. ICR – Intermediate Communications Room

O. CR – Communications Room

P. TE – Telecommunications Enclosure

1.4 ACTION SUBMITTALS

A. Provide in accordance with General Conditions

B. Proposed identification labels to be used for all labeling

C. Proposed methods for installation of identification labels

D. System Labeling Schedules: Electronic copy of labeling schedules in a format approved by the Owner.

E. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.

PART 2 - PRODUCTS

2.1 GENERAL

A. All identification materials and labels shall be machine generated, hand-written labels will not be accepted.

B. All labels must be legible, printed with all capital letters, and may not be smaller than 10pt Arial font or 0.13" in height. At least 4 point spacing between lines must be maintained in all labels that require two or more lines.

2.2 CABINET AND RACK IDENTIFICATION MATERIALS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick.

1. Engraved with white letters on black face.
2. Punched or drilled for mechanical fasteners.
3. Font size shall be no smaller than 1 inch.

2.3 TELECOMMUNICATIONS/EQUIPMENT ENCLOSURE IDENTIFICATION MATERIALS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick.

1. Engraved with white letters on black face.
2. Punched or drilled for mechanical fasteners.
3. Font size shall be no smaller than 1 inch.

2.4 CONDUIT AND FIBER CABLE IDENTIFICATION MATERIALS

A. Pre-labeled steel, anodized steel, or aluminum tags attached to the conduit or fiber cable utilizing the Panduit Pan-Steel System. All identification materials must be weather and chemical resistant.

2.5 HORIZONTAL AND PATCH CABLE IDENTIFICATION MATERIALS

A. Self-adhesive, self-laminating polyester white labels with black text that shall be sized appropriately to wrap around and securely adhere to the cable.

B. Any cables that cannot support the label without overlap, such as fiber patch cables, must use a sleeve or grommet that can be securely fastened to the cable to provide a larger mounting surface for the labels.

2.6 COPPER AND FIBER PATCH PANEL IDENTIFICATION MATERIALS

A. Self-adhesive, self-laminating clear polyester labels that shall be sized appropriately to fit the horizontal copper or fiber patch panel.

B. Arial, or Owner approved equivalent font shall be used with a minimum size of 24pt to a maximum size of 36pt.

2.7 ACTIVE TELECOMMUNICATIONS EQUIPMENT IDENTIFICATION MATERIALS

A. Self-adhesive, self-laminating polyester labels that shall be sized appropriately to fit the active telecommunications device.

B. Clear adhesive labels may be used; however the lettering must contrast with the mounting surface for legibility (e.g. no black text on a dark surface, or white text on a light surface).

PART 3 - EXECUTION

3.1 GENERAL

A. The following provides a general framework for the labeling scheme as developed in cooperation with the Owner. Owner reserves the right to modify the labeling scheme as needed during design workshops to meet their requirements.

3.2 LABELING SCHEME

A. Copper Horizontal Cables Format:

1. Labels shall be affixed to both ends of each cable before the terminations within patch panels in the communications room and data outlets at the end device location.

XXXXYZZZ-EZ-FF-GG

Where,

Item	Description	Value
XXXXYZZZ	Room ID	PIE Room ID number from contract drawings, where XXXX is the location identifier, Y is the building level, and ZZZ is the room number. (note: dashes removed)
EZ	Cabinet/Rack number	Refer to cabinet and rack labeling, where E is the row identifier and Z is the cabinet/rack number
FF	Patch panel number	Up to two characters from A – ZZ. All patch panels shall be sequentially labeled starting from the cabinet/rack at the top starting with the letter ‘A’.
GG	Port number	Up to two characters from 0-50

Example: CACP2024-A1-C-35

Is a cable located in room CACP-2-024, cabinet A1, patch panel C, port 35

B. Fiber Cable Labeling Format:

1. Labels shall be affixed to both ends of each fiber cable before the terminations within patch panels to list their fiber type and quantity, along with the source and destination of the cable.

FFFTT-XXXXYZZZ-EZ-FF > XXXXYZZZ-EZ-FF

Where,

Item	Description	Value
FFF	Fiber Strands	Up to three characters from 0-288
TT	Fiber Type	Two characters SM for Single Mode MM for Multi-Mode
XXXXYZZZ	Room ID	PIE Room ID number from contract drawings, where XXXX is the location identifier, Y is the building level, and ZZZ is the room number. (note: dashes removed)
EZ	Cabinet/Rack number	Refer to cabinet and rack labeling, where E is the row identifier and Z is the cabinet/rack number

FF	Patch panel number	Up to two characters from A – ZZ. All patch panels shall be sequentially labeled starting from the cabinet/rack at the top starting with the letter 'A'.

Example: 144SM-TSS1010-D3-B > TBSO2035-A2-A

Is a 144 strand single mode fiber routed from room TSS-1-010 row D cabinet 3 patch panel B, to room TBSO-2-035 row A cabinet 2 patch panel A.

C. Cabinet/Rack Labeling Format:

1. All cabinets/racks shall be labeled on both the front and the back at the top of the outermost mounting surface. Cabinets and racks shall be numbered from the front from left to right. The labels shall use the following format:

EZ

Where,

Item	Description	Value
E	Row	Single character, using 'A' through 'Z'
Z	Cabinet/rack	Single character, using '0' through '9'

Example: B4

Is the 4th cabinet or rack within row 'B'

2. Refer to the contract drawings to determine the row lettering, cabinet numbers, and front-to-back orientation.

D. Patch Panel Labeling Format:

1. Fiber Patch Panel:

a. All fiber patch panels shall be labeled in communications rooms with a label '*EZ:FF' affixed to the outside face of the fiber shelf's cover*, where EZ is the cabinet/rack identifier and FF is the number of the patch panel. All patch panels shall be sequentially numbered within each cabinet/rack starting at the top with a two-digit number '01'. In addition to this label, all patch panels shall have clear digitally printed adhesive labels attached to the fiber shelf's inside cover with the following format:

A-B-FFFTT to XXXXYZZZ-EZ-FF

Where,

Item	Description	Value
A	Starting Cartridge Bay	Single character, using 'A' through 'M'
B	Ending Cartridge Bay	Single character, using 'A' through 'M'
FFF	Fiber Quantity	Up to three characters from 0-288
TT	Fiber Type	Use either 'MM' or 'SM' to denote fiber type
XXXXYZZZ	Room ID	PIE Room ID number from contract drawings, where XXXX is the location identifier, Y is the building level, and ZZZ is the room number. (note: dashes removed)
EZ	Cabinet/Rack number	Refer to cabinet and rack labeling, where E is the row identifier and Z is the cabinet/rack number
FF	Patch panel number	Up to two characters from A – ZZ. All patch panels shall be sequentially labeled starting from the cabinet/rack at the top starting with the letter 'A'.

Example: A-F-144SM to TSS1010-D4-C

Is 144 single mode fibers from bays A through F connecting to room TSS-1-010's row D cabinet 4 patch panel C

Note: If the destination of the fiber from the patch panel is not another communications room, replace '*XXXXYZZZ-EZ-FF'* with the name of the special destination (e.g. "Gate 8" or "Hangar 18")

E. Conduit Labeling Format:

1. All conduits shall have labels affixed to both ends of the pathway for easy identification. Any pathway that is easily accessible (e.g. pathway within accessible ceiling spaces) must have additional labels affixed at 50' intervals. Labels shall use the following 'to and from' labeling format:

XXXXYZZZ / XXXXYZZZ

Where, XXXXYZZZ is the PIE Room ID number from contract drawings: XXXX is the location identifier, Y is the building level, and ZZZ is the room number

3.3 LABELING VERIFICATION

A. Labeling shall be in accordance with the contract documents.

B. Labeling shall meet the requirements in this document, and the ANSI/TIA/EIA 606, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings, where applicable.

C. Cable labels shall be placed in the following locations: on jack face plates, on cable inside back boxes, junction boxes, access points, and manholes/handholes, on cable above the terminations in the MDF, and IDFs, on patch panels and every 50 feet when not in conduit.

D. Conduits shall be labeled every 50 feet and at the origination and destination using an orange label with black lettering. All labels shall be printed using a laser type printer and in no location shall any labels be handwritten.

E. Fiber Optic Cable Termination Cabinet/Housing Labeling:

1. Fiber optic termination housings shall be labeled using the plastic panel provided by the termination housing manufacturer. The plastic panel shall be overlaid with a one piece, self-adhesive, full size, laser printer generated label sheet adhered to the inside of the door of the enclosure. Contractor shall cut sheet to size. An 8.5 x 11 inch laser printable adhesive backed sheet, part number Avery 5165.
2. The background color of the labeling sheet shall be colored coded. Singlemode labels shall be Yellow in color and Multimode labels shall be Orange in color. Singlemode housing connector panels shall always be placed first, and to the immediate left hand side of the housing, followed by the Multimode connectors. This sequence shall apply to both Singlemode and Multimode strands in the same cable (Hybrid), or in separate cables. In wall-mounted housings, the Singlemode connectors shall always be placed in the very most top position, followed by the Multimode connectors.
3. Each terminal housing shall contain only one labeling sheet to identify the fiber optic strands. Multiple labels on a single door shall not be used.
4. Labeling font shall be Arial, 10 point, unless otherwise noted.
5. Fiber strand numbering shall be consistent with the Consecutive Fiber Numbering (CFN) sequence as identified in TIA/EIA 568-B.1. This fiber strand numbering sequence shall be accomplished at each terminated end of the fiber optic cable. The rolling of fiber optic strands, as identified in TIA/EIA 568-B.1 as Reverse Pair Positioning (RPP) shall not be used.

F. Fiber optic housings containing vertical connector panels shall be labeled as follows.

1. Fiber strand number 1 (Blue) shall occupy fiber port number 1 in the upper most left position of the first duplex bulkhead connector installed in the connector panel placed in the first slot on the left side of the housing.
2. Fiber strand number 2 (Orange) shall occupy fiber port number 2 of the same duplex bulkhead connector installed in the connector panel. This number 2 port is to the immediate right of fiber port number 1.
3. All remaining fiber optic strands shall be number consecutively left to right, top to bottom.

G. Fiber Optic Housings containing horizontal connector panels shall be labeled as follows:

1. Fiber strand number 1 (Blue) shall occupy fiber port number 1 in the upper most top, left position, of the first duplex bulkhead connector installed in the connector panel placed in the upper most left slot of the housing.

2. Fiber strand number 2 (Orange) shall occupy fiber port number 2 of the same duplex bulkhead connector installed in the connector panel. This number 2 port is located immediate below fiber port number 1.
3. All remaining fiber optic strands shall be number consecutively top to bottom, left to right.

H. All fiber cables where visible in each manhole, handhole, cable-tray, and junction box will be tagged with an orange wrap around cable identification wrap that is waterproof and hot stamped printed. Fiber optic cables in cable trays shall be tagged every 100 feet.

I. All fiber innerduct where visible in each manhole, handhole, cable-tray, and junction box innerduct will be labeled with an orange wrap around identification wrap that is waterproof and hot stamped printed – identifying the cable content of the innerduct. Above ground conduits containing fiber must be labeled or tagged every 100 feet. Tags and labels must be submitted to Owner for approval prior to installation.

J. The labeling format shall be identified and a complete record shall be provided to the Owner with the final documentation.

K. Each cable shall be identified with the type of signal being carried and termination points.

L. On individual fibers in fan-out tubing, a fiber label is required labeling fiber as 1, 2, 3 or blue, orange, green, etc. Label is a hot stamped, heat shrink type label approved by Owner prior to use.

M. Fiber Optic Splice Shelf Labeling:

1. Fiber optic splice shelves and drawers shall be labeled sequentially from top to bottom.
2. Identify the fiber splices using a single sheet, adhesive backed, labeling stock printed using a laser printer trimmed to fit the inside door of the splice shelf.
3. Identify in tabular form the splice tray, position number and the fiber strand spliced at that location.
4. Labeling shall consist of the cable number, the fiber optic strand number and the strand type.

N. Fiber Optic Cable Sheath Labeling:

1. Fiber optic cables located inside buildings shall have their sheaths labeled within 12 inches of the fiber termination housing, the point at which the cable enters and/or exits the room, and at one mid-point location when the cable is installed in a cable tray or ladder, as a minimum.
2. The fiber optic cable label shall consist of either a stainless steel or a plastic type tag attached with a steel or plastic tie wrap. Plastic label shall be yellow and black in color, and contain a self-laminating cover for use with pre-printed labels. Both the tag and tie wrap shall be approved for interior and exterior use. White color tie wraps shall be used indoors, and black color tie wraps shall be used outdoors. Riser rated labels and tie wraps shall be used where required.
3. All fiber optic cables shall contain a fiber optic warning tag. All warning tags shall be orange in color and contain large black letters. Tags shall be made from PVC

type material and install by snapping over the cable sheath. The fiber optic cable sheath label shall contain the cable type, total strand count of the cable, the origination and destination locations, Rack, Panel and Fiber Count

O. Copper Cable Termination Housing Labeling:

1. Building entrance terminals shall be labeled with the name of the building, the building identification number, the cable pair numbers entering the terminal, and the cable pair number exiting the terminal (if applicable).
2. Terminals shall too be labeled using an electronic label maker and the label shall be placed on the wall above the terminal housing. The terminal housing itself shall not be labeled.
3. Labeling font shall be Arial, 10 point, unless otherwise noted.

P. Copper Cable Sheath Labeling:

1. Copper cables located inside buildings shall have their sheaths labeled within 12 inches of the termination housing, the point at which the cable enters and/or exits the room, and at one mid-point location when the cable is installed in a cable tray or ladder, as a minimum. Additional sheath labels may be installed at the request of Owner.
2. The copper cable label shall consist of either a stainless steel or a plastic type tag attached with a steel or plastic tie wrap. Plastic label shall be grey in color, and have a write on surface. This tag shall be approved for interior and exterior use. White color tie wraps shall be used indoors, and black color tie wraps shall be used outdoors. Riser rated labels and tie wraps shall be used where required.
3. The copper cable sheath label shall contain the type of cable, cable number, cable pair count and number of dead cable pairs, if applicable.

END OF SECTION 27 05 54

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SECTION 270800 - TESTING OF COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section

B. All other Division 27 specifications.

1.2 SUMMARY

A. This section includes the testing requirements for backbone, riser, and horizontal cabling, as well as communications field verification services required to perform the specified testing and inspections. All testing and verification shall be performed by the Contractor and witnessed by Owner or Engineer.

1.3 SUBMITTALS

A. Manufacturer’s data for all proposed testing equipment and materials.

B. List of test equipment to be used for testing Contractor to perform work.

C. Equipment shall be calibrated with trace ability to National Institute of Standards and Testing (NIST) requirements.

D. Contractor shall include copy of calibration and certification that equipment calibration meets NIST standards and has been calibrated at least once in the past year (365 days) from the date of testing.

E. Testing Plan that has been coordinated with Owner.

F. All members of the testing team must be certified by the manufacturer as having completed the necessary training to complete their part of the testing. Resumes of the entire team shall be provided along with documentation of completed training courses as part of the BID process.

G. Certified test reports of the Contractor performed tests. Copies of the performed tests shall be submitted within one week of completion of tests. Test equipment and procedures shall conform to manufacturer’s requirements to obtain warranty. Each set of test results will be reviewed by the Owner’s representative for a maximum of two times for completion. In the event that the test results are not acceptable upon the second review, the Contractor shall be responsible for any cost incurred to the Owner for further review.

PART 2 PRODUCTS

2.1 NOT APPLICABLE

PART 3 EXECUTION

3.1 TESTING AND VERIFICATION

A. General

1. Refer to specification 27 05 00 paragraph 3.8 for additional testing requirements.
2. Communications Field verification services shall be required in a timely manner for the purpose of acceptance of the installation.
3. All cable test results must use the permanent affixed label for the test's identification name/number.

B. Testing

1. Must be supervised on-site by a BICSI RCDD. Must demonstrate knowledge and compliance with all BICSI, TIA/EIA, UL, and NEC standards and codes
2. All members of the Contractor's team must be certified by the manufacturer as having completed the necessary training to complete their part of the field verification. Resumes of the entire team shall be provided along with documentation of completed training courses.

C. Field Verification Reports

1. After each inspection and test, the Contractor shall promptly submit 2 copies of field verification report to the project management team.
2. Each report shall include:

a. Date Issued.
b. Project Title and number.
c. Project Phase of Testing
d. Field Verification Contractor name, address and telephone number.
e. Name of inspector and job number.
f. Date and time of sampling or inspection.
g. Record of temperature and weather conditions.
h. Date of test.
i. Identification of specification section.
j. Location of test in the Project.
k. Cable ID where applicable.
l. Type of inspection or test.
m. Results of tests and compliance with Contract Documents.
n. Interpretation of test results.

D. Contractor's Responsibilities

1. Provide incidental labor and facilities to provide access to work to be tested, to facilitate tests and inspections, and for storage of test equipment.

2. Notify the Owner (1) calendar week prior to expected time for operations requiring inspection and testing services.

    a. When tests or inspections cannot be performed after such notice, the Contractor shall notify the Owner.

E. Payment for Testing

1. Retesting:

    a. When initial tests indicate non-compliance with the Contract Documents, all subsequent retesting occasioned by the non-compliances shall be performed by the Contractor and the costs thereof will be borne by the Contractor.
    b. Contractor's Convenience Testing:

        1) Inspecting and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

F. Code Compliance Testing

1. Inspections and tests required by codes or ordinances, or by a plan approval authority having jurisdiction over the project site, and which are made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

3.2 TESTING OF CATEGORY 6A UTP

A. The Category 6A UTP cable runs shall be tested for full compliance with TIA/EIA 568-C.1 and C.2, Category 6a specifications and construction documents. Testing shall be performed with an ISO/IEC 61935-1 Level IIIe test set at a minimum. Testing shall be performed as outlined in TSB-95, TSB-155-A, and ANSI/TIA/EIA 568B specifications and shall include length, wire map, shield continuity, characteristic impedance, attenuation, propagation delay, delay skew, return loss, Near-End Crosstalk (NEXT), Far-End Crosstalk (FEXT), Attenuation to Crosstalk Ratio, Far-end (ACR-F), Power Sum Attenuation to Crosstalk Ratio, Far – End (PS ACR-F), and Attenuation to Crosstalk Ratio – Near End (ACR-N). The entire channel shall pass TSB-155-A, and ANSI/TIA/EIA 568B.2 requirements. Any pairs not meeting the requirements of the standard shall be brought into compliance by the Contractor at no charge to Owner. Complete end to end (including patch chord) test results must be submitted to the Owner.

B. Electrical Characteristics:

Mutual Capacitance	5.6 nF/100 at 1 KHz
Characteristic Impedance	100 MHz: 100 ± 15 ohms; 250 MHz: 100 ± 22 ohms; 500 MHz: 100 ± 32 ohms
DC Resistance Max	9.38 Ohms/100m)
Positive ACR	Out to 500 MHz-km

C. All Category 6A UTP cables shall meet or exceed the following cabling specifications for ISO/IEC 11801-2.1 for Class Ea (TIA/EIA Category 6A UTP):

Freq (MHz)	Insertion Loss (dB) Min.	PS-NEXT (dB) Min.	PS ACR-N (dB) Min.	PS-ACR-F (dB) Min.	PS AACR-F	Return Loss
100	20.9	37.1	16.2	20.3	37.0	12.0
200	30.1	31.9	1.8	14.2	31.0	9.0
300	37.4	28.8	-8.6	10.7	27.5	7.2
400	43.7	26.6	-17.1	8.2	25.0	6.0
500	49.3	24.8	-24.5	6.3	23.0	6.0

3.3 FIBER OPTIC TESTING

A. The Contractor shall provide all personnel, equipment, instrumentation, and supplies necessary to perform all testing. An Owner representative shall have the option to witness all field tests.

B. Factory Test: Prior to shipment of the FO cable, 100 percent of the fibers shall be tested with an optical time domain reflectometer at 850/1300 nm for multimode fiber and 1310/1550 nm for single-mode fiber. The optical time domain reflectometer shall be calibrated to show anomalies of 0.2 dB as a minimum. All information and supporting data of factory testing for each strand of fiber shall be furnished to the Airport as support documentation for before and after installation data.

C. Field Test: The Contractor shall verify the complete operation of any provided data transmission equipment during the field testing. Tests shall be performed on 100 percent of the fibers of each circuit and repeated from the opposite end of each circuit. Field tests shall include as a minimum:

1. After termination and bulkhead mounting, each terminated fiber is to be tested for end-to-end (including patch chord) loss with a power meter/light source. Power attenuation test shall be performed in the 850 nm and 1300 nm for multimode or 1310 nm and 1550 nm for single mode wavelength band of the transmitter to be used on the circuit being tested. The flux shall be measured at the FO receiver end and shall be compared to the flux injected at the transmitter end. There shall be a jumper added at each end of the circuit under test so that end connector loss shall be validated. Rotational optimization of the connectors will not be permitted. The circuit loss shall not exceed the calculated circuit loss by more than 1 dB.

2. Digital copies of the test results shall be provided to the Airport with clear “Pass” or “Fail” based on the requirements above. If the test returns a circuit with a “Fail” or is deemed unsatisfactory by the Airport, the circuit shall be examined to determine the problem. The Airport shall be notified of the problem and what procedures the Contractor proposes to eliminate the problem. The Contractor shall prepare a report documenting the results of the test.

D. The insertion loss for each mated fiber optic connector pair shall be $\leq$ 0.75 dB. Reflectance for single-mode single fiber UPC cable assemblies shall be $\leq$ -55 dB. Mated connector pair loss testing shall be based on one unidirectional OTDR inspection in accordance with the OTDR operating manual for systems greater than 300 feet.

E. In addition to connector insertion loss for each mated pair, the Contractor shall perform end-to-end insertion loss testing for each multimode fiber at 850 nm and 1300 nm from one direction for each terminated fiber span in accordance with TIA-526-14-B (OFSTP 14) and single-mode fibers at 1310 nm and 1550 nm from one direction for each terminated fiber span in accordance with TIA-526-7 (OFSTP 7). For spans greater than 90 meters, each tested span must test to a value less than or equal to the value determined by calculating a link loss budget. For horizontal spans less than or equal to 90 meters, each tested span must be < 2.0 Db.

F. Inspect each terminated multimode fiber span for continuity and anomalies with an OTDR at 1300 nm from one direction in accordance with the OTDR operating manual for systems greater than 300 feet. Inspect each terminated single-mode fiber span for continuity and anomalies with an OTDR at 1550 nm from one direction in accordance with OTDR operating manual for systems greater than 300 feet.

G. Test fiber strands for Optical Return Loss (ORL). All fiber’s must have an ORL > 60 dB.

END OF SECTION 270800

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SECTION 271300 - STRUCTURED CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This section includes the requirements for the installation of communications cabling, associated supporting components, and equipment which includes the following:

1. Copper cabling.
2. Fiber Optic Cabling.
3. Cable connecting hardware, patch panels, and cross-connects.

B. Related Sections:

1. All other Division 27 specifications.
2. All other Division 28 specifications

1.3 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.

B. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.

C. EMI: Electromagnetic interference.

D. IDC: Insulation displacement connector.

E. LAN: Local area network.

F. NRTL: Nationally Recognized Testing Laboratories

G. OSP: Outside Plant

H. RCDD: Registered Communications Distribution Designer.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: All wiring, patch panels, jacks and other related technology systems shall be rated and tested to meet ANSI/TIA/EIA 568B.

B. Cable and its connecting hardware provide the means of transporting signals between the telecommunications outlet/connector and the horizontal cross-connect located in the communications equipment room. This cabling and its connecting hardware are called a "permanent link," a term that is used in the testing protocols.

1. TIA/EIA-568-C.0 specifies that cable lengths depend on the application and the media chosen. All Ethernet applications are limited to 100 m on UTP media; therefore, the maximum permanent link length is 295 feet (95 m). Analog phone, fax, and ISDN applications are allowed to exceed this limitation.

C. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications outlet/connector.

D. Bridged taps and splices shall not be installed in the horizontal cabling.

E. Splitters shall not be installed as part of the optical fiber cabling.

F. Topology: Star Configuration.

1.5 SUBMITTALS

A. Provide submittals for each of the items detailed below:

1. Communication system block diagram
2. Details of all connections to power sources, including grounding.
3. Details of all surge protection device installations.
4. Details of all cable routing in buildings.
5. Cabling administration drawings and printouts.
6. Wiring diagrams to show typical wiring schematics including the following:

    a. Cross-connects.
    b. Patch panels.
    c. Patch cords.

7. Cross-connects and patch panels. Detail mounting assemblies and show elevations and physical relationship between the installed components.

8. Qualification Data: Provide qualification data for fiber optic and copper cable installer as detailed in “Quality Control” paragraph.

9. Manufacturer’s Data:

    a. Fiber optic cable
    b. Connectors
    c. Splice housing
    d. Service loop housings
    e. Any other equipment supplied as part of the FO system

10. Field quality-control reports.

11. Maintenance Data: For splices and connectors to include in maintenance manuals.

B. Operations and Maintenance manuals in accordance with specification 27 05 00

1.6 DELIVERY, STORAGE, AND HANDLING

A. Copper Cabling

1. Preparation for delivery: The copper cable shall be shipped on reels in lengths as specified with a minimum overage of ten (10) percent.
2. The cable shall be wound on the reel so that unwinding can be done without kinking the cable.
3. Two (2) meters of cable at both ends of the cable shall be accessible for testing.
4. Marking: Each reel shall have a permanent label attached showing length, cable identification number, cable size, cable type, and date of manufacture. Labels shall be water-resistant and the writing on the labels shall be indelible.
5. Storage: The cable shall have a minimum storage temperature range of minus 40 degrees Celsius to plus 70 degrees Celsius.
6. Copper materials shall be delivered in original packages with labels intact and identification clearly marked. Materials damaged prior to final installation acceptance shall be replaced at no extra cost.

B. Fiber Optic Cabling

1. Test fiber optical cables upon receipt at Project site. Refer to specification 27 08 00
2. Test optical fiber cable to determine the continuity of the strand end to end. Use optical loss test set.
3. Test optical fiber cable while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector, including the loss value of each. Retain test data and include the record in maintenance data. Refer to specification 27 08 00 for additional details.
4. The completed cable shall be packaged for shipment on a non-returnable wooden reels. Required cable lengths shall be stated in the purchase order.
5. Top and bottom ends of the cable shall be available for testing.
6. Both ends of the cable shall be sealed to prevent the ingress of moisture.
7. Each reel shall have a weather resistant tag attached identifying the reel and cable.
8. The reel tag shall include the following information:

    a. Cable Number
    b. Shipped Cable Length in Meters
    c. Product Number
    d. Date Cable was Tested
    e. Cable Length Markings
    f. Gross Weight
    g. Job Order Number
    h. Customer Order Number
    i. Order Number

j. Item Number

9. The reel (one flange) marking shall include:

   a. Country of Origin (e.g. USA)

   b. An arrow indicating power direction of roll when handling

   c. Fork lift-handling illustration

   d. DO NOT SHIP REEL ON SIDE" or "DO NOT LAY REEL ON ITS SIDE"

10. Each cable shall be accompanied by a cable data sheet. This data sheet shall be submitted to the Airport as part of the final documentation. This cable data sheet shall include the following information:

    a. Cable Number
    b. Factory Order Number
    c. Customer Purchase Order Number
    d. Mark for Information
    e. Measured Attenuation of Each Fiber (for lengths > 1000 m)
    f. Product Number
    g. Customer Name
    h. Customer Cable Number
    i. Ordered Length
    j. Actual Shipped Length

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

B. Contractor shall be required to comply with all applicable safety regulations.

C. Contractor shall be required to comply with all Airport Badging requirements.

D. The Contractor shall be responsible for determining actual existing site conditions.

1.8 COORDINATION

A. Coordinate layout and installation of telecommunications pathways and cabling with the Owner's telecommunications and LAN equipment and service suppliers.

B. At the request of the customer, the cable manufacturer shall provide installation procedures and technical support concerning the items contained in this specification.

1.9 QUALITY CONTROL:

A. Contractor shall be a certified installer of the cable system being deployed. Contractor shall register project warranty with the cable manufacturer prior to installation.

B. Contractor must employ at least one registered communications distribution engineer (RCDD). Contractor shall provide resume of RCDD to Airport and Engineer prior to commencing work.

C. Contractor shall have test equipment as detailed in specification 27 08 00.

PART 2 - PRODUCTS

2.1 Copper Cabling

A. All copper cable provided in project shall meet the below general requirements:

1. Cable manufacturer shall be ISO 9001 Certified and included in the Underwriters Laboratories LAN Certification and Follow-up Program.
2. All copper cable shall utilize the appropriate sheath for the particular application. This shall be in accordance with ANSI/EIA/TIA-568-B standards. Any cable placed in space used as an air return or in any way connected with air handling plenums or building ventilation shall be low-smoke, fire retarding cable, and must comply with the National Electrical Code Articles 725, 760, and 800.
3. Cable Colors:

    a. Data/Voice – Blue
    b. Wireless Access Points – White
    c. Security System – Black
    d. Fire Alarm/Life Safety – Red

4. Manufactures:

    a. Superior Essex
    b. Legrand
    c. Ortronics
    d. Approved Equal

B. Station Cable

1. Unshielded 23 AWG plenum rated Category 6A rated copper cables shall be used throughout the project. The bending radius and pulling strength requirements of all cables shall be observed and documented during handling and installation.
2. Jacket: flame retardant and low smoke CMP
3. Conductor shall be solid annealed copper
4. Suitable for 10BaseT through 10Gbase-T Ethernet communications
5. PoE+ IEEE 802.3at Type 1 and 2
6. UL Verified CAT 6A tested to 650MHZ

7. Color of jacket shall be in accordance with paragraph 2.1-A

C. Patch Cord:

1. Shall be factory made and pre-connectorized and meet or exceed the requirements of ANSI/TIA-568-C
2. UL Listed as cable type CMR
3. RJ-45 patch cords are to be UTP CAT6A, 23AWG stranded copper
4. Color of jacket shall be in accordance with paragraph 2.1-A
5. Cord length shall come in 3', 5', and 7' lengths as determined by project requirements.

2.2 Fiber Optic Cable, Connectors, and Patch Cords

A. Physical Characteristics: 600 lb. maximum installation tension (short term), 200 lb. maximum operating tension (long term). The minimum installation bend radius shall be a minimum of 15 times the cable outer diameter, and the minimum operating bend radius shall be a minimum of 10 times the cable outer diameter.

B. Optical Fiber Connectors: Factory pigtail LC Duplex connectors shall be fusion spliced using pigtail splice cartridges. Pigtail connections shall be performed in accordance with the manufacturer's instructions.

C. Optical Fiber Splices: With the exception of splices for connection of factory termination pigtails, no splices shall be permitted in new fiber installs unless the length of the cable being installed exceeds the maximum cable length available from the manufacturer and prior written approval is obtained from the Owner. Optical fiber splices if required, shall be fusion type with a maximum insertion loss of 0.05 dB.

D. Buffer Tube Fan-out Kits: Fan-out kits shall be designed to allow individual termination of multi-fiber cables. Breakout kits shall include PVC tubing with Kevlar strength members or equivalent, heat shrinkage boot material and epoxy. Breakout kits shall be designed to integrate with the fiber cable. NOTE: ALL FIBER TERMINATIONS SHALL UTILIZE FACTORY TERMINATED PIGTAIL CONNECTORS UNLESS OTHERWISE NOTED ON THE CONTRACT DRAWINGS. NO FAN-OUT KITS AND FIELD INSTALLED CONNECTORS SHALL BE USED WITHOUT WRITTEN APPROVAL BY THE OWNER.

E. Plenum rated cable shall be used for all interior installations. Outside plant cable shall be used for all applications where cable is to be run in underground conduits. Outside plant cable may not be used for interior applications without written, pre-approval from the Owner.

F. General Fiber Specifications

1. All fiber optic cable will meet or exceed the attenuation specification of the TIA-568-C.3 Table 1 for the relevant optical fiber type.
2. Each optical fiber shall be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical, and environmental requirements of this specification.

3. Each optical fiber shall consist of a doped silica core surrounded by a concentric glass cladding. The fiber shall be a matched clad design.
4. Each optical fiber shall be proof tested by the fiber manufacturer at a minimum of 100 kpsi (0.7 GN/m^2).
5. The fiber shall be coated with a dual layer acrylate protective coating. The coating shall be in physical contact with the cladding surface.
6. The attenuation specification shall be a maximum value for each cabled fiber at 23 $\pm$ 5 °C on the original shipping reel.

G. Single-mode Fiber

1. The single-mode fiber shall be manufactured by Corning and shall be minimum 24 Strand OS-2 fiber.
2. Optical fibers shall be placed inside a loose buffer tube. The nominal outer diameter of the buffer tube shall be 3.0 mm.
3. Each buffer tube shall contain up to 12 fibers.
4. The fibers shall not adhere to the inside of the buffer tube.
5. Each fiber shall be distinguishable by means of color-coding in accordance with TIA-598-C, "Optical Fiber Cable Color Coding."
6. The fibers shall be colored with ultraviolet (UV) curable inks.
7. Buffer tubes containing fibers shall be color-coded with distinct and recognizable colors in accordance with TIA-598-C, "Optical Fiber Cable Color Coding."
8. In buffer tubes containing multiple fibers, the colors shall be stable across the specified storage and operating temperature range and not subject to fading or smearing onto each other or into the gel filling material. Colors shall not cause fibers to stick together.
9. The buffer tubes shall be resistant to external forces and shall meet the buffer tube cold bend and shrink-back requirements of 7 CFR 1755.900.
10. Fillers may be included in the cable core to lend symmetry to the cable cross-section where needed. Fillers shall be placed so that they do not interrupt the consecutive positioning of the buffer tubes. In dual layer cables, any fillers shall be placed in the inner layer. Fillers shall be nominally 3.0 mm in outer diameter.
11. The central member shall consist of a dielectric, glass reinforced plastic (GRP) rod (optional steel central member). The purpose of the central member is to provide tensile strength and prevent buckling. The central member shall be over coated with a thermoplastic when required to achieve dimensional sizing to accommodate buffer tubes/fillers.
12. Each buffer tube shall contain a water-swellable yarn for water-blocking protection. The water-swellable yarn shall be non-nutritive to fungus, electrically non-conductive, and homogeneous. It shall also be free from dirt or foreign matter. This yarn will preclude the need for other water-blocking material; the buffer-tube shall be gel-free.
13. Buffer tubes shall be stranded around the dielectric central member using the reverse oscillation, or "S-Z", stranding process. Water swellable yarn(s) shall be applied longitudinally along the central member during stranding.
14. Two polyester yarn binders shall be applied contra-helically with sufficient tension to secure each buffer tube layer to the dielectric central member without crushing the buffer tubes. The binders shall be non-hygroscopic, non-wicking,

and dielectric with low shrinkage.

15. For single layer cables, a water swellable tape shall be applied longitudinally around the outside of the stranded tubes/fillers. The water swellable tape shall be non-nutritive to fungus, electrically non-conductive, and homogenous. It shall also be free from dirt and foreign matter.
16. Non-armored cables shall contain at least one ripcord under the sheath for easy sheath removal. Armored cables shall contain at least one ripcord under the inner sheath and at least one ripcord under the steel armor for easy sheath removal.
17. Tensile strength shall be provided by the central member, and additional dielectric yarns as required.
18. The dielectric yarns shall be helically stranded evenly around the cable core.
19. Non-armored cables shall be sheathed with medium density polyethylene (MDPE).The minimum nominal jacket thickness shall be 1.4 mm. Jacketing material shall be applied directly over the tensile strength members (as required) and water swellable tape. The polyethylene shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus. See Figure 1.

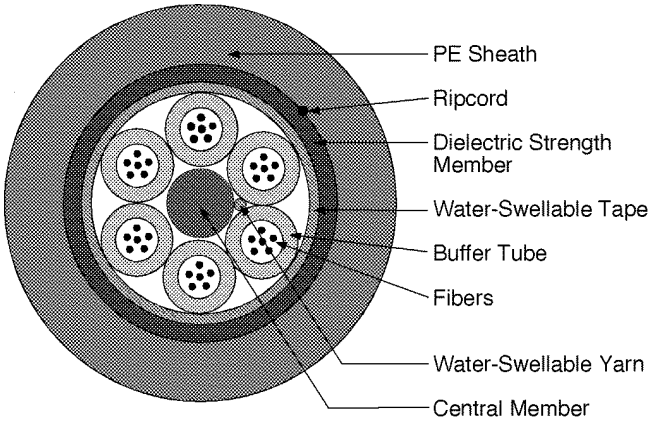

Figure 1

20. Cable jackets shall be marked with the manufacturer's name, month and year of manufacture, sequential meter or foot markings, a telecommunication handset symbol as required by Section 350G of the National Electrical Safety Code (NESC®), fiber count, and fiber type. The actual length of the cable shall be within -0/+1% of the length markings. The print color shall be white, with the exception that cable jackets containing one or more coextruded white stripes, which shall be printed in light blue. The height of the marking shall be approximately 2.5 mm.
21. If the initial marking fails to meet the specified requirements (i.e., improper text statement, color, legibility, or print interval), the cable may be remarked using a contrasting alternate color. The numbering sequence will differ from the previous numbering sequence, and a tag will be attached to both the outside end of the cable and to the reel to indicate the sequence of remarking. The preferred remarking color will be yellow, with the secondary choice being blue.
22. Comply with TIA/EIA-568-C.0
23. Comply with ICEA S-83-596 for mechanical properties.

24. Comply with TIA/EIA-568-C.3 for performance specifications.
25. Maximum Attenuation:

    a. Standard Cable Attenuation: 5.0 dB/km at 850 nm; 3.0 dB/km at 1300 nm.
    b. Low-loss Cable attenuation: 3.0 dB/km at 850 nm; 1.0 dB/km at 1300 nm.

26. Minimum Modal Bandwidth:

    a. Standard cable: 300 MHz-km.
    b. Low-loss cable: 600 MHz-km.

27. Jacket:

    a. Jacket Color: Yellow for single-mode cable.
    b. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-C.
    c. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches (1000 mm).

H. Fiber Patch Cords:

1. Patch Cords: Factory-made, dual-fiber cables in 36-inch (900-mm) lengths
2. 8.3/125-micron fiber for single mode fiber connections
3. Attenuation: Max 1.0db/lm@1310 nm and 1.0db/km@1550nm
4. Patch cord shall be Yellow, and factory made with LC connectors
5. Dual zip jacketed
6. OS-2 type construction
7. Maximum insertion loss of 0.5db and reflectance of -30db

2.3 Fiber Optic Patch Panel

A. 19” Rack Mountable

B. Only fusion splicing is allowed with a power loss no greater 0.1db

C. All fiber terminations shall be racked mounted and support LC type connectors. Only Corning connecters are to be used.

D. Equipped with swing out mechanism or sliding drawer to access fiber terminations.

E. Provided with bend radius control throughout the panel as well as storage for slack cabling.

F. Shall meet the performance criteria of ANSI/TIA-568-C.3

G. Provided with mechanism for strain relief and securing cable strength member.

H. Each cable shall be individually attached to the termination housing by mechanicals means. The outer cable jacket shall be removed to reveal inner buffer tubes. Each buffer tube shall be attached to its respective splice enclosure. Cable strength members shall be attached to the cable strain relief bracket. Maximum 12 fibers per tray.

I. All spare fiber tubes shall be installed into fiber trays.

J. Each fiber tube shall be stripped upon entering the splice tray and the individual protected strands of fiber routed into the splice tray.

2.4 IDENTIFICATION PRODUCTS

A. Comply with requirements in Section 27 05 54 "Identification for Communications Systems" for labeling.

PART 3 - EXECUTION

3.1 PRE-CONSTRUCTION MEETING

A. Attend a pre-construction meeting with the Owner to review installation standards prior to doing any work.

3.2 PREPERATION

A. Verify conduits, raceways, and boxes are properly installed following BICSI recommended practices and ANSI/TIA/EIA 569A standards.

B. Verify conduit is minimum 1 -inch diameter and existing J-hook system has sufficient capacity for additional low voltage cabling.

C. Ensure that all cable reel tests have been performed and that the cable has passed all tests. Submit test results to Airport for review and acceptance.

D. Prior to beginning of any fiber installation or termination the Fiber Installation team shall meet with the Airport IT to discuss all procedures and requirements and to review the condition of the conduit and raceway installations.

E. ALL fiber submittals must be approved by Airport in writing BEFORE any fiber installation or terminations can begin. Airport requires five business days from receipt of fiber submittals to review for comment. Non-approved submittals will be returned for re-submission. Re-submitted fiber submittals require five additional business days for review and comment.

F. After approval of ALL fiber submittals and prior to beginning any fiber installation or termination: The Fiber Installation team shall meet with the Airport IT to discuss all procedures and requirements and to review the condition of the conduit and raceway installations

3.3 COPPER INSTALLATION

A. Install work following drawings, manufacturer's instructions, and approved submittal data. The number of cables per run, outlet configuration, and other pertinent data shall be included on the drawings.

B. All installation shall be performed in conformance with ANSI/TIA/EIA 568B and BICSI installation guidelines. The Contractor shall ensure that the maximum pulling tensions of the specified distribution cables are not exceeded and cable bends maintain the proper radius during the placement of the facilities. Failure to follow the appropriate guidelines shall require the Contractor to provide, in a timely fashion, the additional material and labor necessary to properly rectify the situation. This shall also apply to any and all damages sustained to the cables by the Contractor during the implementation.

C. Riser and tie cables shall be extended between communications rooms utilizing the interfloor conduit sleeves.

D. All components of the cabling system shall be installed in a neat and professional manner. Wiring color codes shall be strictly observed and terminations shall be uniform throughout the installation. All cables shall be neatly dressed at the termination points. The cabling installation shall meet all applicable national and local codes pertaining to low voltage cable system installations.

E. The Contractor shall provide service loops (slack) for cables terminating in IDF and the MDF room. A six (6) foot service loop shall be provided above the access ceiling or cable trays unless specified otherwise.

F. Upon completion of the installation, the Contractor shall prepare as-built documentation of the entire structured cable installation. This documentation should include:

1. Drawings
2. Documentation
3. This data shall be submitted prior to the use of any system components. System acceptance will not be provided without complete as-built documentation.

3.4 FIBER INSTALLATION

A. All system components and appurtenances shall be installed in accordance with the manufacturer's instructions and as shown. All necessary interconnections, services, and adjustments required for a complete and operable FO system shall be provided.

B. Contractor shall pump liquid from existing manholes used to install FO cables as may be required. When working in manholes, conform to all airport confined workspace requirements.

C. Install additional new pull strings with cable installation in existing or new duct bank and liner ducts.

D. Do not use steel fish tapes in conduits or duct banks with existing cables if the there is more than a 10 percent fill factor.

E. Splices:

1. No splices other than pigtail terminations shall be permitted unless the length of the cable being installed exceeds the maximum cable length available from the manufacturer and prior written approval is obtained from the Owner.
2. Fiber optic splices shall be made by fusion splicing.
3. Cable splices other than pigtails or other cable terminations shall be housed in a splice enclosure.
4. All FO splices shall be field tested at the time of splicing. Splices shall have less than 0.2 dB loss.
5. Sufficient cable shall be provided in each splicing location to properly rack and splice the cables.
6. All cable ends shall be protected at all times with end caps except during actual splicing operations, means shall be provided to protect the unspliced portions of the cable from the intrusion of moisture and other foreign matter.

F. Cable Installation:

1. All fiber must be installed/protected in innerduct and conduit.
2. Pulling fixtures shall be attached to the cable strength members. If indirect attachments are used, the grip diameter and length shall be matched to the cable diameter and characteristics. Attachment is used on cables having only central strength members; the pulling forces shall be reduced to ensure that the fibers are not damaged form forces being transmitted to the strength member.
3. Continuously monitor pull line tension during cable pulling. Do not exceed the maximum tension as given by the cable manufacturer.
4. The mechanical stress placed upon a cable during installation shall be such that the cable is not twisted or stretched.
5. Use cable feeder guide between the cable reel and guide it into the duct or conduit as it is played off the reel.
6. Inspect cable jacket carefully for defects as cable is played off the reel.
7. Take precautions during installation to prevent the cable from being kinked or crushed.
8. Do not exceed minimum bend radius of the cable.

G. Cable Installation Vertical Runs:

1. When possible, use gravity to assist in cable pulling.
2. Pull cable from top of run to bottom of run.
3. Hand pull if possible.
4. If machine assistance is required, monitor tension and do not exceed specific cable tension limits.
5. After installation, the vertical tension on the cable shall be relieved at maximum intervals of 100 feet using a split support grip.

H. Service Loops:

1. Each fiber optic cable shall have service loops of not less than 3 meters in length at each end.
2. Fiber optic cables terminating at video cameras shall have a service loop of 1 meter at the camera end, and service loop shall be housed in the video junction box.
3. Service loops 50 feet in length (minimum) shall be provided for each FO cable at all handholes and manhole unless otherwise indicated on the contract drawings. Service loop lengths shall be in addition to any extra cable needed for splices made at the handhole or manhole.
4. Service loops in communication manholes must be neatly coiled and hung on cable management racks.
5. Service loops shall not be smaller than the minimum bend radius of the cable, pigtail or jumper which forms the service loop.

I. Fiber Breakout:

1. All fiber terminations shall utilize factory terminated pigtail connectors unless otherwise noted on the contract drawings. No fan-out kits and field installed connectors shall be used without written approval by the Owner. If fiber breakout connections are depicted on the contract drawings and/or approved by the Owner in writing the following shall apply:
2. All fiber cable ends shall have heat shrink installed at the transition from cable to loose tube or fan out kits.
3. On the back plane of a fiber optic patch panel or wall mounted distribution panel use a 25 inch fan-out assembly on loose tube fiber similar to the Corning P/N FAN-BT25-12. Not required for a tight buffer cable.
4. On the front plane (service-side) of a fiber optic patch panel or wall mounted distribution panel, a spider fan-out kit should be used on loose tube or tight buffered cable.

J. Fiber Marking:

1. All fiber cables shall be imprinted on the jacket at regular intervals of not more than five feet with the manufacturer’s name, cable type and model number.
2. Labeling:

    a. All fiber cables where visible in each manhole, handhole, cable-tray, and junction box will be tagged with an orange wrap around cable identification wrap that is waterproof and hot stamped printed. Fiber optic cables in cable trays shall be tagged every 100 feet.
    b. All fiber innerduct where visible in each manhole, handhole, cable-tray, and junction box innerduct will be labeled with an orange wrap around identification wrap that is waterproof and hot stamped printed – identifying the cable content of the innerduct. Above ground conduits containing fiber must be labeled or tagged every 100 feet. Schedules for all tags and labels must be submitted to Airport Fiber staff for approval prior to installation.
    c. Tag and label naming convention shall be in accordance with specification 27 05 54. The labeling format shall be identified and a complete record shall be provided to the Owner with the final documentation.
    d. On individual fibers in fan-out tubing, a fiber label is required labeling fiber

as 1, 2, 3 or blue, orange, green, etc. Label is a hot stamped, heat shrink type label approved by Airport prior to use.

3.5 Surge Protection:

A. All equipment connected to ac circuits shall be protected from power line surges. Equipment shall meet the requirements of IEEE C62.41. Fuses shall not be used for surge protection.

B. All communications equipment shall be protected against surges induced on any wireline connections of any communications circuit. All wireline cables and conductors serving as a communications circuit between a fiber optic transmitter or receiver and any other device shall have surge protectors installed at each end. Additional triple electrode gas surge protectors rated for the application on each wireline circuit shall be installed within 3 feet of the building cable entrance. Fuses shall not be used for surge protection. The inputs and outputs shall be tested in both normal mode and common mode using the following waveforms.

1. A 10 microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 volts and a peak current of 60 amperes.
2. An 8 microsecond rise time by 20 microsecond pulse width waveform with a peak voltage of 1000 volts and a peak current of 500 amperes

3.6 FIRESTOPPING

A. Comply with requirements in Section 07 84 13 "Penetration Firestopping."

B. Comply with TIA/EIA-569-A, Annex A, "Firestopping."

C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.7 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with ANSI/TIA-607-B.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 6 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.

D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.8 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Visually inspect optical fiber jacket materials for NRTL certification markings.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment, and labeling of all components.
3. Optical Fiber Cable Tests:

    a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
    b. Link End-to-End Attenuation Tests:

        1) Backbone link measurements: Test at 850 or 1300 nm in 1 direction according to TIA/EIA-526-14-A, Method B, One Reference Jumper.
        2) Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-B.1.

4. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.
5. Remove and replace cabling where test results indicate that they do not comply with specified requirements.
6. End-to-end cabling will be considered defective if it does not pass tests and inspections.
7. Prepare test and inspection reports.

3.9 TESTING

A. Comply with requirements in Section “27 08 00 “Testing of Communications Systems” for testing of optical fiber cabling.

3.10 WARRANTY

A. The warranty on all copper cabling materials, services, and adherence of the copper cabling system to this specification shall be for a period of not less than twenty-five (25) years.

B. If items supplied as part of this project have longer warranties, the Contractor shall supply longer warranty.

C. The copper cabling warranty shall certify that the cabling system shall support and conform to ANSI/TIA/EIA-568B specifications covering any current or future application, which supports transmission over a properly constructed horizontal cabling system premises network.

D. Copper cabling system shall meet performance requirements of ANSI/TIA/EIA-568B, TIA/EIA TSB-67, and TIA/EIA TSB-95 including NEXT, PSNEXT, ELFEXT, PSELFEXT,

return loss, propagation delay, delay skew, bandwidth, characteristic impedance, attenuation/loss channel, and attenuation to crosstalk ratio (ACR) requirements.

E. The warranty shall cover the replacement or repair of defective product(s) and labor for the replacement or repair of such defective product(s).

F. The successful Bidder shall provide a minimum twenty year extended product and labor warranty for any premises backbone UTP cabling solution provided by the products manufacturer.

G. The successful Bidder shall warrant that all materials and equipment furnished under the contract are in good working order, free from defects, and in conformance with system specifications. All installed equipment must conform to the manufacturer's official published specifications. The warranty shall begin at the system acceptance date and remain in effect for a period of twenty-five (25) years from that date. The successful Bidder shall agree to repair, adjust, and/or replace (as determined by the Purchaser to be in its best interest) any defective equipment, materials, or other parts of the system at the successful Bidder's sole cost. The Purchaser will incur no costs for service or replacement of parts during the warranty period of 25 years. All third party warranties shall be passed through from Bidder to Purchaser.

H. The successful Bidder shall warrant and supply evidence that the installation of materials and hardware will be made in strict compliance with all applicable provisions of the National Electric Code, the rules and regulations of the Federal Communications Commission, and state and/or local codes or ordinances that may apply.

I. The successful Bidder shall warrant that the system will function as specified in the approved manufacturer's Technical Description Guide.

END OF SECTION 271300

ITEM C-100

CONTRACTOR QUALITY CONTROL PROGRAM (CQCP)

ITEM C-100, "CONTRACTOR QUALITY CONTROL PROGRAM (CQCP)" is a technical specification contained in Federal Aviation Administration Advisory Circular – 150/5370-10H, "Standard Specifications for Construction of Airports."

This item has been modified to make allowances for local materials, methods and requirements. This item has been updated and modified to comply with the latest editions of other applicable codes, from knowledge gained on other airport construction projects and valuable lessons learned from airport maintenance staffs.

Deletions are noted by the ~~strikethrough~~ method.

Changes and additions are noted by the ***bold italic*** method.

ITEM C-100

CONTRACTOR QUALITY CONTROL PROGRAM (CQCP)

100-1 General. Quality is more than test results. Quality is the combination of proper materials, testing, workmanship, equipment, inspection, and documentation of the project. Establishing and maintaining a culture of quality is key to achieving a quality project. The Contractor shall establish, provide, and maintain an effective Contractor Quality Control Program (CQCP) that details the methods and procedures that will be taken to assure that all materials and completed construction required by this contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors. Although guidelines are established and certain minimum requirements are specified here and elsewhere in the contract technical specifications, the Contractor shall assume full responsibility for accomplishing the stated purpose.

The Contractor shall establish a CQCP that will:

a. Provide qualified personnel to develop and implement the CQCP.

b. Provide for the production of acceptable quality materials.

c. Provide sufficient information to assure that the specification requirements can be met.

d. Document the CQCP process.

The Contractor shall not begin any construction or production of materials to be incorporated into the completed work until the CQCP has been reviewed and approved by the Resident Project Representative (RPR). No partial payment will be made for materials subject to specific quality control (QC) requirements until the CQCP has been reviewed and approved.

The QC requirements contained in this section and elsewhere in the contract technical specifications are in addition to and separate from the quality assurance (QA) testing requirements. QA testing requirements are the responsibility of the RPR or Contractor as specified in the specifications.

A Quality Control (QC)/Quality Assurance (QA) workshop with the Engineer, Resident Project Representative (RPR), Contractor, subcontractors, testing laboratories, and Owner's representative must be held prior to start of construction. The QC/QA workshop will be facilitated by the Contractor. The Contractor shall coordinate with the Airport and the RPR on time and location of the QC/QA workshop. Items to be addressed, at a minimum, will include:

a. Review of the CQCP including submittals, QC Testing, Action & Suspension Limits for Production, Corrective Action Plans, Distribution of QC reports, and Control Charts.

b. Discussion of the QA program.

c. Discussion of the QC and QA Organization and authority including coordination and information exchange between QC and QA.

d. Establish regular meetings to discuss control of materials, methods and testing.

e. Establishment of the overall QC culture.

100-2 Description of program.

a. **General description.** The Contractor shall establish a CQCP to perform QC inspection and testing of all items of work required by the technical specifications, including those performed by subcontractors. The CQCP shall ensure conformance to applicable specifications and plans with respect to materials, off-site fabrication, workmanship, construction, finish, and functional performance. The CQCP shall be effective for control of all construction work performed under this Contract and shall specifically include surveillance and tests required by the technical specifications, in addition to other requirements of this section and any other activities deemed necessary by the Contractor to establish an effective level of QC.

b. **Contractor Quality Control Program (CQCP).** The Contractor shall describe the CQCP in a written document that shall be reviewed and approved by the RPR prior to the start of any production, construction, or off-site fabrication. The written CQCP shall be submitted to the RPR for review and approval at least 10 calendar days before the CQCP Workshop. The Contractor's CQCP and QC testing laboratory must be approved in writing by the RPR prior to the Notice to Proceed (NTP).

   The CQCP shall be organized to address, as a minimum, the following:

   1. QC organization and resumes of key staff
   2. Project progress schedule
   3. Submittals schedule
   4. Inspection requirements
   5. QC testing plan
   6. Documentation of QC activities and distribution of QC reports
   7. Requirements for corrective action when QC and/or QA acceptance criteria are not met
   8. Material quality and construction means and methods. Address all elements applicable to the project that affect the quality of the pavement structure including subgrade, subbase, base, and surface course. Some elements that must be addressed include, but is not limited to mix design, aggregate grading, stockpile management, mixing and transporting, placing and finishing, quality control testing and inspection, smoothness, laydown plan, equipment, and temperature management plan.

   The Contractor must add any additional elements to the CQCP that is necessary to adequately control all production and/or construction processes required by this contract.

100-3 CQCP organization. The CQCP shall be implemented by the establishment of a QC organization. An organizational chart shall be developed to show all QC personnel, their authority, and how these personnel integrate with other management/production and construction functions and personnel.

The organizational chart shall identify all QC staff by name and function, and shall indicate the total staff required to implement all elements of the CQCP, including inspection and testing for

each item of work. If necessary, different technicians can be used for specific inspection and testing functions for different items of work. If an outside organization or independent testing laboratory is used for implementation of all or part of the CQCP, the personnel assigned shall be subject to the qualification requirements of paragraphs 100-03a and 100-03b. The organizational chart shall indicate which personnel are Contractor employees and which are provided by an outside organization.

The QC organization shall, as a minimum, consist of the following personnel:

a. Program Administrator. The Contractor Quality Control Program Administrator (CQCPA) must be a full-time employee of the Contractor, or a consultant engaged by the Contractor. The CQCPA must have a minimum of five (5) years of experience in QC pavement construction with prior QC experience on a project of comparable size and scope as the contract.

Included in the five (5) years of paving/QC experience, the CQCPA must meet at least one of the following requirements:

(1) Professional Engineer with one (1) year of airport paving experience.

(2) Engineer-in-training with two (2) years of airport paving experience.

(3) National Institute for Certification in Engineering Technologies (NICET) Civil Engineering Technology Level IV with three (3) years of airport paving experience.

(4) An individual with four (4) years of airport paving experience, with a Bachelor of Science Degree in Civil Engineering, Civil Engineering Technology or Construction.

The CQCPA must have full authority to institute any and all actions necessary for the successful implementation of the CQCP to ensure compliance with the contract plans and technical specifications. The CQCPA authority must include the ability to immediately stop production until materials and/or processes are in compliance with contract specifications. The CQCPA must report directly to a principal officer of the construction firm. The CQCPA may supervise the Quality Control Program on more than one project provided that person can be at the job site within two (2) hours after being notified of a problem.

b. QC technicians. A sufficient number of QC technicians necessary to adequately implement the CQCP must be provided. These personnel must be either Engineers, engineering technicians, or experienced craftsman with qualifications in the appropriate field equivalent to NICET Level II in Civil Engineering Technology or higher, and shall have a minimum of two (2) years of experience in their area of expertise.

The QC technicians must report directly to the CQCPA and shall perform the following functions:

(1) Inspection of all materials, construction, plant, and equipment for conformance to the technical specifications, and as required by paragraph 100-6.

(2) Performance of all QC tests as required by the technical specifications and paragraph100-8.

(3) Performance of tests for the RPR when required by the technical specifications.

Certification at an equivalent level of qualification and experience by a state or nationally recognized organization will be acceptable in lieu of NICET certification.

c. Staffing levels. The Contractor shall provide sufficient qualified QC personnel to monitor each work activity, at all times. Where material is being produced in a plant for incorporation into the work, separate plant and field technicians shall be provided at each plant and field placement location. The scheduling and coordinating of all inspection and testing must match the type and pace of work activity. The CQCP shall state where different technicians will be required for different work elements.

100-4 Project progress schedule. Critical QC activities must be shown on the project schedule as required by Section 80, paragraph 80-03, *Execution and Progress*.

100-5 Submittals schedule. The Contractor shall submit a detailed listing of all submittals (for example, mix designs, material certifications) and shop drawings required by the technical specifications. The listing can be developed in a spreadsheet format and shall include as a minimum:

a. Specification item number

b. Item description

c. Description of submittal

d. Specification paragraph requiring submittal

e. Scheduled date of submittal

100-6 Inspection requirements. QC inspection functions shall be organized to provide inspections for all definable features of work, as detailed below. All inspections shall be documented by the Contractor as specified by paragraph 100-9.

Inspections shall be performed as needed to ensure continuing compliance with contract requirements until completion of the particular feature of work. Inspections shall include the following minimum requirements:

a. During plant operation for material production, QC test results and periodic inspections shall be used to ensure the quality of aggregates and other mix components, and to adjust and control mix proportioning to meet the approved mix design and other requirements of the technical specifications. All equipment used in proportioning and mixing shall be inspected to ensure its proper operating condition. The CQCP shall detail how these and other QC functions will be accomplished and used.

b. During field operations, QC test results and periodic inspections shall be used to ensure the quality of all materials and workmanship. All equipment used in placing, finishing, and compacting shall be inspected to ensure its proper operating condition and to ensure that all such operations are in conformance to the technical specifications and are within the plan dimensions, lines, grades, and tolerances specified. The CQCP shall document how these and other QC functions will be accomplished and used.

100-7 Contractor QC testing facility.

a. For projects that include Item P-401, Item P-403, and Item P-404, the Contractor shall ensure facilities, including all necessary equipment, materials, and current reference

standards, are provided that meet requirements in the following paragraphs of ASTM D3666, *Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials*:

- 8.1.3 Equipment Calibration and Checks;
- 8.1.9 Equipment Calibration, Standardization, and Check Records;
- 8.1.12 Test Methods and Procedures

b. For projects that include P-501, the Contractor shall ensure facilities, including all necessary equipment, materials, and current reference standards, are provided that meet requirements in the following paragraphs of ASTM C1077, Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation:

- 7 Test Methods and Procedures
- 8 Facilities, Equipment, and Supplemental Procedures

100-8 QC testing plan. As a part of the overall CQCP, the Contractor shall implement a QC testing plan, as required by the technical specifications. The testing plan shall include the minimum tests and test frequencies required by each technical specification Item, as well as any additional QC tests that the Contractor deems necessary to adequately control production and/or construction processes.

The QC testing plan can be developed in a spreadsheet fashion and shall, as a minimum, include the following:

a. Specification item number (e.g., P-401)

b. Item description (e.g., Hot Mix Asphalt Pavements)

c. Test type (e.g., gradation, grade, asphalt content)

d. Test standard (e.g., ASTM or American Association of State Highway and Transportation Officials (AASHTO) test number, as applicable)

e. Test frequency (e.g., as required by technical specifications or minimum frequency when requirements are not stated)

f. Responsibility (e.g., plant technician)

g. Control requirements (e.g., target, permissible deviations)

The QC testing plan shall contain a statistically-based procedure of random sampling for acquiring test samples in accordance with ASTM D3665. The RPR shall be provided the opportunity to witness QC sampling and testing.

All QC test results shall be documented by the Contractor as required by paragraph 100-9.

100-9 Documentation. The Contractor shall maintain current QC records of all inspections and tests performed. These records shall include factual evidence that the required QC inspections

or tests have been performed, including type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, causes for rejection, etc.; proposed remedial action; and corrective actions taken.

These records must cover both conforming and defective or deficient features, and must include a statement that all supplies and materials incorporated in the work are in full compliance with the terms of the contract. Legible copies of these records shall be furnished to the RPR daily. The records shall cover all work placed subsequent to the previously furnished records and shall be verified and signed by the CQCPA.

Contractor QC records required for the contract shall include, but are not necessarily limited to, the following records:

a. Daily inspection reports. Each Contractor QC technician shall maintain a daily log of all inspections performed for both Contractor and subcontractor operations. These technician's daily reports shall provide factual evidence that continuous QC inspections have been performed and shall, as a minimum, include the following:

(1) Technical specification item number and description

(2) Compliance with approved submittals

(3) Proper storage of materials and equipment

(4) Proper operation of all equipment

(5) Adherence to plans and technical specifications

(6) Summary of any necessary corrective actions

(7) Safety inspection.

(8) [Photographs and/or video]

The daily inspection reports shall identify all QC inspections and QC tests conducted, results of inspections, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed.

The daily inspection reports shall be signed by the responsible QC technician and the CQCPA. The RPR shall be provided at least one copy of each daily inspection report on the workday following the day of record. When QC inspection and test results are recorded and transmitted electronically, the results must be archived.

b. Daily test reports. The Contractor shall be responsible for establishing a system that will record all QC test results. Daily test reports shall document the following information:

(1) Technical specification item number and description

(2) Test designation

(3) Location

(4) Date of test

(5) Control requirements

(6) Test results

(7) Causes for rejection

(8) Recommended remedial actions

(9) Retests

Test results from each day's work period shall be submitted to the RPR prior to the start of the next day's work period. When required by the technical specifications, the Contractor shall maintain statistical QC charts. When QC daily test results are recorded and transmitted electronically, the results must be archived.

100-10 Corrective action requirements. The CQCP shall indicate the appropriate action to be taken when a process is deemed, or believed, to be out of control (out of tolerance) and detail what action will be taken to bring the process into control. The requirements for corrective action shall include both general requirements for operation of the CQCP as a whole, and for individual items of work contained in the technical specifications.

The CQCP shall detail how the results of QC inspections and tests will be used for determining the need for corrective action and shall contain clear rules to gauge when a process is out of control and the type of correction to be taken to regain process control.

When applicable or required by the technical specifications, the Contractor shall establish and use statistical QC charts for individual QC tests. The requirements for corrective action shall be linked to the control charts.

100-11 Inspection and/or observations by the RPR. All items of material and equipment are subject to inspection and/or observation by the RPR at the point of production, manufacture or shipment to determine if the Contractor, producer, manufacturer or shipper maintains an adequate QC system in conformance with the requirements detailed here and the applicable technical specifications and plans. In addition, all items of materials, equipment and work in place shall be subject to inspection and/or observation by the RPR at the site for the same purpose.

Inspection and/or observations by the RPR does not relieve the Contractor of performing QC inspections of either on-site or off-site Contractor's or subcontractor's work.

100-12 Noncompliance.

a. The Resident Project Representative (RPR) will provide written notice to the Contractor of any noncompliance with their CQCP. After receipt of such notice, the Contractor must take corrective action.

b. When QC activities do not comply with either the CQCP or the contract provisions or when the Contractor fails to properly operate and maintain an effective CQCP, and no effective corrective actions have been taken after notification of non-compliance, the RPR will recommend the Owner take the following actions:

(1) Order the Contractor to replace ineffective or unqualified QC personnel or subcontractors and/or

(2) Order the Contractor to stop operations until appropriate corrective actions are taken.

METHOD OF MEASUREMENT

100-13 Basis of measurement and payment. Not Used

BASIS OF PAYMENT

100-14 Payment will be made under:

There is no separate payment for this item. This shall be incidental to the cost of Pay Item C-105-1 Mobilization.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

National Institute for Certification in Engineering Technologies (NICET)

ASTM International (ASTM)

ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D3666	Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

END OF ITEM C-100

ITEM C-102

TEMPORARY AIR AND WATER POLLUTION, SOIL EROSION, AND SILTATION CONTROL

ITEM C-102, “TEMPORARY AIR AND WATER POLLUTION SOIL EROSION, AND SILTATION CONTROL” is a technical specification contained in Federal Aviation Administration Advisory Circular – 150/5370-10H, “Standard Specifications for Construction of Airports.”

This item has been modified to make allowances for local materials, methods and requirements. This item has been updated and modified to comply with the latest editions of other applicable codes, from knowledge gained on other airport construction projects and valuable lessons learned from airport maintenance staffs.

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ITEM C-102

TEMPORARY AIR AND WATER POLLUTION, SOIL EROSION, AND SILTATION CONTROL

DESCRIPTION

102-1.1 This item shall consist of temporary control measures as shown on the plans or as ordered by the Resident Project Representative (RPR) during the life of a contract to control pollution of air and water, soil erosion, and siltation through the use of silt fences, berms, dikes, dams, sediment basins, fiber mats, gravel, mulches, grasses, slope drains, and other erosion control devices or methods.

Temporary erosion control shall be in accordance with the approved erosion control plan; the approved Construction Safety and Phasing Plan (CSPP) and AC 150/5370-2, *Operational Safety on Airports During Construction*. The temporary erosion control measures contained herein shall be coordinated with the permanent erosion control measures specified as part of this contract to the extent practical to assure economical, effective, and continuous erosion control throughout the construction period.

Temporary control may include work outside the construction limits such as borrow pit operations, equipment and material storage sites, waste areas, and temporary plant sites.

Temporary control measures shall be designed, installed and maintained to minimize the creation of wildlife attractants that have the potential to attract hazardous wildlife on or near public-use airports.

MATERIALS

102-2.1 Grass. Grass that will not compete with the grasses sown later for permanent cover per Item T-901shall be a quick-growing species (such as ryegrass, Italian ryegrass, or cereal grasses) suitable to the area providing a temporary cover. Selected grass species shall not create a wildlife attractant.

102-2.2 Mulches. Mulches may be hay, straw, fiber mats, netting, bark, wood chips, or other suitable material reasonably clean and free of noxious weeds and deleterious materials per Item T-908. Mulches shall not create a wildlife attractant.

102-2.3 Fertilizer. Fertilizer shall be a standard commercial grade and shall conform to all federal and state regulations and to the standards of the Association of Official Agricultural Chemists.

102-2.4 Slope drains. Slope drains may be constructed of pipe, fiber mats, rubble, concrete, asphalt, or other materials that will adequately control erosion.

102-2.5 Silt fence. Silt fence shall consist of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life. Silt fence shall meet the requirements of ASTM D6461.

102-2.6 Other. All other materials shall meet commercial grade standards and shall be approved by the RPR before being incorporated into the project.

CONSTRUCTION REQUIREMENTS

102-3.1 General. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other federal, state, or local agencies, the more restrictive laws, rules, or regulations shall apply.

The RPR shall be responsible for assuring compliance to the extent that construction practices, construction operations, and construction work are involved.

102-3.2 Schedule. Prior to the start of construction, the Contractor shall submit schedules in accordance with the approved Construction Safety and Phasing Plan (CSPP) and the plans for accomplishment of temporary and permanent erosion control work for clearing and grubbing; grading; construction; paving; and structures at watercourses. The Contractor shall also submit a proposed method of erosion and dust control on haul roads and borrow pits and a plan for disposal of waste materials. Work shall not be started until the erosion control schedules and methods of operation for the applicable construction have been accepted by the RPR.

102-3.3 Construction details. The Contractor will be required to incorporate all permanent erosion control features into the project at the earliest practicable time as outlined in the plans and approved CSPP. Except where future construction operations will damage slopes, the Contractor shall perform the permanent seeding and mulching and other specified slope protection work in stages, as soon as substantial areas of exposed slopes can be made available. Temporary erosion and pollution control measures will be used to correct conditions that develop during construction that were not foreseen during the design stage; that are needed prior to installation of permanent control features; or that are needed temporarily to control erosion that develops during normal construction practices, but are not associated with permanent control features on the project.

Where erosion may be a problem, schedule and perform clearing and grubbing operations so that grading operations and permanent erosion control features can follow immediately if project conditions permit. Temporary erosion control measures are required if permanent measures cannot immediately follow grading operations. The RPR shall limit the area of clearing and grubbing, excavation, borrow, and embankment operations in progress, commensurate with the Contractor’s capability and progress in keeping the finish grading, mulching, seeding, and other such permanent control measures current with the accepted schedule. If seasonal limitations make such coordination unrealistic, temporary erosion control measures shall be taken immediately to the extent feasible and justified as directed by the RPR.

The Contractor shall provide immediate permanent or temporary pollution control measures to minimize contamination of adjacent streams or other watercourses, lakes, ponds, or other areas of water impoundment as directed by the RPR. If temporary erosion and pollution control measures are required due to the Contractor’s negligence, carelessness, or failure to install permanent controls as a part of the work as scheduled or directed by the RPR, the work shall be performed by the Contractor and the cost shall be incidental to this item.

The RPR may increase or decrease the area of erodible earth material that can be exposed at any time based on an analysis of project conditions.

The erosion control features installed by the Contractor shall be maintained by the Contractor during the construction period.

Provide temporary structures whenever construction equipment must cross watercourses at frequent intervals. Pollutants such as fuels, lubricants, bitumen, raw sewage, wash water from

concrete mixing operations, and other harmful materials shall not be discharged into any waterways, impoundments or into natural or manmade channels.

102-3.4 Installation, maintenance and removal of silt fence. Silt fences shall extend a minimum of 16 inches (41 cm) and a maximum of 34 inches (86 cm) above the ground surface. Posts shall be set no more than 10 feet (3 m) on center. Filter fabric shall be cut from a continuous roll to the length required minimizing joints where possible. When joints are necessary, the fabric shall be spliced at a support post with a minimum 12-inch (300-mm) overlap and securely sealed. A trench shall be excavated approximately 4 inches (100 mm) deep by 4 inches (100 mm) wide on the upslope side of the silt fence. The trench shall be back-filled and the soil compacted over the silt fence fabric. The Contractor shall remove and dispose of silt that accumulates during construction and prior to establishment of permanent erosion control. The fence shall be maintained in good working condition until permanent erosion control is established. Silt fence shall be removed upon approval of the RPR.

METHOD OF MEASUREMENT

102-4.1 Temporary erosion and pollution control work required will be performed as scheduled or directed by the RPR. Completed and accepted work will be measured as follows:

~~**a.** Temporary seeding and mulching will be measured by the square yard (square meter).~~

~~**b.** Temporary slope drains will be measured by the linear foot (meter).~~

~~**c.** Temporary benches, dikes, dams, and sediment basins will be measured by the cubic yard (cubic meter) of excavation performed, including necessary cleaning of sediment basins, and the cubic yard (cubic meter) of embankment placed as directed by the RPR.~~

~~**d.** All fertilizing will be measured by the ton (kg).~~

~~**e.** Installation and removal of silt fence will be measured by the Lump sum.~~

Temporary erosion control shall be a lump sum item and measured based on percentage of completion of the project.

102-4.2 Control work performed for protection of construction areas outside the construction limits, such as borrow and waste areas, haul roads, equipment and material storage sites, and temporary plant sites, will not be measured and paid for directly but shall be considered as a subsidiary obligation of the Contractor.

BASIS OF PAYMENT

102-5.1 Accepted quantities of temporary water pollution, soil erosion, and siltation control work ordered by the RPR and measured as provided in paragraph 102-4.1 will be paid for under:

~~Item C-102-5.1a Temporary seeding and mulching - per square yard (square meter)~~

~~Item C-102-5.1b Temporary slope drains - per linear foot (meter)~~

~~Item C-102-5.1c Temporary benches, dikes, dams and sediment basins~~

~~- per cubic yard (cubic meter)~~

~~Item C-102-5.1d Fertilizing - per ton (kg)~~

~~Item C-102-5.1e Installation and removal of silt fence - lump sum~~

Item C-102-1 Erosion & Pollution Control - per Lump Sum (LS)

Where other directed work falls within the specifications for a work item that has a contract price, the units of work shall be measured and paid for at the contract unit price bid for the various items.

Temporary control features not covered by contract items that are ordered by the RPR will be paid for in accordance with Section 90, paragraph 90-05 *Payment for Extra Work*.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5200-33 *Hazardous Wildlife Attractants on or Near Airports*

AC 150/5370-2 *Operational Safety on Airports During Construction*

ASTM International (ASTM)

ASTM D6461 *Standard Specification for Silt Fence Materials*

United States Department of Agriculture (USDA)

FAA/USDA Wildlife Hazard Management at Airports, A Manual for Airport Personnel

END OF ITEM C-102

ITEM C-105

MOBILIZATION

ITEM C-105, "MOBILIZATION" is a technical specification contained in Federal Aviation Administration Advisory Circular – 150/5370-10H, "Standard Specifications for Construction of Airports."

This item has been modified to make allowances for local materials, methods and requirements. This item has been updated and modified to comply with the latest editions of other applicable codes, from knowledge gained on other airport construction projects and valuable lessons learned from airport maintenance staffs.

Deletions are noted by the ~~strikethrough~~ method.

Changes and additions are noted by the ***bold italic*** method.

ITEM C-105

MOBILIZATION

DESCRIPTION

105-1.1 This item of work shall consist of, but is not limited to, work and operations necessary for the movement of personnel, equipment, material and supplies to and from the project site for work on the project except as provided in the contract as separate pay items.

MOBILIZATION LIMIT

105-2.1 Mobilization shall be limited to 10 percent of the total project cost.

POSTED NOTICES

105-3.1 Prior to commencement of construction activities, the Contractor must post the following documents in a prominent and accessible place where they may be easily viewed by all employees of the prime Contractor and by all employees of subcontractors engaged by the prime Contractor: Equal Employment Opportunity (EEO) Poster "Equal Employment Opportunity is the Law" in accordance with the Office of Federal Contract Compliance Programs Executive Order 11246, as amended; Davis Bacon Wage Poster (WH 1321) - DOL "Notice to All Employees" Poster; and Applicable Davis-Bacon Wage Rate Determination. These notices must remain posted until final acceptance of the work by the Owner.

ENGINEER/RPR FIELD OFFICE

105-4.1 An Engineer/RPR field office is not required.

MEATHOD OF MEASUREMENT

105-5.1 Based upon the contract lump sum price for "Mobilization" partial payments will be allowed as follows:

a. With first pay request, 25%.

b. When 25% or more of the original contract is earned, an additional 25%.

c. When 50% or more of the original contract is earned, an additional 40%.

d. After Final Inspection, staging area clean-up and delivery of all Project Closeout materials as required by Section 90, paragraph 90-11, *Contractor Final Project Documentation,* the final 10%.

BASIS OF PAYMENT

101-6.1 Payment will be made under:

Item C-105-1	***Mobilization***	***-per Lump Sum (LS)***
Item C-105-2	***Maintenance of Traffic***	***-per Lump Sum (LS)***

REFERENCES

101-7.1 The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Office of Federal Contract Compliance Programs (OFCCP)

Executive Order 11246, as amended

EEOC-P/E-1 – Equal Employment Opportunity is the Law Poster

END OF SECTION C-105

ITEM P-101

PREPARATION/REMOVAL OF EXISTING PAVEMENTS

ITEM P-101, "PREPARATION/REMOVAL OF EXISTING PAVEMENTS" is a technical specification contained in Federal Aviation Administration Advisory Circular – 150/5370-10H, "Standard Specifications for Construction of Airports."

This item has been modified to make allowances for local materials, methods and requirements. This item has been updated and modified to comply with the latest editions of other applicable codes, from knowledge gained on other airport construction projects and valuable lessons learned from airport maintenance staffs.

Deletions are noted by the ~~strikethrough~~ method.

Changes and additions are noted by the ***bold italic*** method.

ITEM P-101

PREPARATION/REMOVAL OF EXISTING PAVEMENTS

DESCRIPTION

101-1.1 This item shall consist of preparation of existing pavement surfaces for overlay, surface treatments, removal of existing pavement, and other miscellaneous items. The work shall be accomplished in accordance with these specifications and the applicable plans.

EQUIPMENT AND MATERIALS

101-2.1 All equipment and materials shall be specified here and in the following paragraphs or approved by the Resident Project Representative (RPR). The equipment shall not cause damage to the pavement to remain in place.

CONSTRUCTION

101-3.1 Removal of existing pavement. The Contractor's removal operation shall be controlled to not damage adjacent pavement structure, and base material, cables, utility ducts, pipelines, or drainage structures which are to remain under the pavement.

a. **Concrete pavement removal.** Full depth saw cuts shall be made perpendicular to the slab surface. The Contractor shall saw through the full depth of the slab including any dowels at the joint, removing the pavement and installing new dowels as shown on the plans and per the specifications. Where the perimeter of the removal limits is not located on the joint and there are no dowels present, the perimeter shall be saw cut the full depth of the pavement. The pavement inside the saw cut shall be removed by methods which will not cause distress in the pavement which is to remain in place. If the material is to be wasted on the airport site, it shall be reduced to a maximum size of. Concrete slabs that are damaged by under breaking shall be repaired or removed and replaced as directed by the RPR.

   The edge of existing concrete pavement against which new pavement abuts shall be protected from damage at all times. Spall and underbreak repair shall be in accordance with the plans. Any underlaying material that is to remain in place, shall be recompacted and/or replaced as shown on the plans. Adjacent areas damaged during repair shall be repaired or replaced at the Contractor's expense.

b. **Asphalt pavement removal.** Asphalt pavement to be removed shall be cut to the full depth of the asphalt pavement around the perimeter of the area to be removed. If the material is to be incorporated into embankment, it shall be broken to a maximum size of 1 inches (25 mm)**.**

c. **Repair or removal of Base, Subbase, and/or Subgrade.** All failed material including surface, base course, subbase course, and subgrade shall be removed and repaired as shown on the plans or as directed by the RPR. Materials and methods of construction shall comply with the applicable sections of these specifications. Any damage caused by Contractor's removal process shall be repaired at the Contractor's expense.

101-3.2 Preparation of joints and cracks prior to overlay/surface treatment. Remove all vegetation and debris from cracks to a minimum depth of 1 inch (25 mm). If extensive vegetation exists, treat the specific area with a concentrated solution of a water-based herbicide approved

by the RPR. Fill all cracks greater than 1/4 inch (6 mm) wide) with a crack sealant The crack sealant, preparation, and application shall be compatible with the surface treatment/overlay to be used. To minimize contamination of the asphalt with the crack sealant, underfill the crack sealant a minimum of 1/8 inch (3 mm), not to exceed ¼ inch (6 mm). Any excess joint or crack sealer shall be removed from the pavement surface.

101-3.3 Removal of Foreign Substances/contaminates prior remarking. Removal of foreign substances/contaminates from existing pavement that will affect the bond of the new treatment shall consist of removal of rubber, fuel spills, oil, crack sealer, at least 90% of paint, and other foreign substances from the surface of the pavement. Areas that require removal are designated on the plans and as directed by the RPR in the field during construction.

High-pressure water or rotary grinding may be used. If chemicals are used, they shall comply with the state's environmental protection regulations. Removal methods used shall not cause major damage to the pavement, or to any structure or utility within or adjacent to the work area. Major damage is defined as changing the properties of the pavement, removal of asphalt causing the aggregate to ravel, or removing pavement over 1/8 inch (3 mm) deep. If it is deemed by the RPR that damage to the existing pavement is caused by operational error, such as permitting the application method to dwell in one location for too long, the Contractor shall repair the damaged area without compensation and as directed by the RPR.

Removal of foreign substances shall not proceed until approved by the RPR. Water used for high-pressure water equipment shall be provided by the Contractor at the Contractor's expense. No material shall be deposited on the pavement shoulders. All wastes shall be disposed of in areas indicated in this specification or shown on the plans.

101-3.4 Concrete spall or failed asphaltic concrete pavement repair.

a. **Repair of concrete spalls in areas to be overlaid with asphalt.** The Contractor shall repair all spalled concrete as shown on the plans or as directed by the RPR. The perimeter of the repair shall be saw cut a minimum of 2 inches (50 mm) outside the affected area and 2 inches (50 mm) deep. The deteriorated material shall be removed to a depth where the existing material is firm or cannot be easily removed with a geologist pick. The removed area shall be filled with asphalt mixture with aggregate sized appropriately for the depth of the patch. The material shall be compacted with equipment approved by the RPR until the material is dense and no movement or marks are visible. The material shall not be placed in lifts over 4 inches (100 mm) in depth. This method of repair applies only to pavement to be overlaid.

b. **Asphalt pavement repair.** The Contractor shall repair all spalled concrete as shown on the plans or as directed by the RPR. The failed areas shall be removed as specified in paragraph 101-3.1b. All failed material including surface, base course, subbase course, and subgrade shall be removed. Materials and methods of construction shall comply with the applicable sections of these specifications.

101-3.5 Cold milling. Milling shall be performed with a power-operated milling machine or grinder, capable of producing a uniform finished surface. The milling machine or grinder shall operate without tearing or gouging the underlaying surface. The milling machine or grinder shall be equipped with grade and slope controls, and a positive means of dust control. All millings shall be removed and disposed off Airport property. If the Contractor mills or grinds deeper or wider than the plans specify, the Contractor shall replace the material removed with new material at the Contractor's Expense.

A. Patching. The milling machine shall be capable of cutting a vertical edge without chipping or spalling the edges of the remaining pavement and it shall have a positive method of controlling the depth of cut. The RPR shall layout the area to be milled with a straightedge in increments of 1-foot (30 cm) widths. The area to be milled shall cover only the failed area. Any excessive area that is milled because the Contractor doesn't have the appropriate milling machine, or areas that are damaged because of his negligence, shall be repaired by the Contractor at the Contractor's Expense.

B. Profiling, grade correction, or surface correction. The milling machine shall have a minimum width of 7 feet (2 m) and it shall be equipped with electronic grade control devices that will cut the surface to the grade specified. The tolerances shall be maintained within +0 inch and -1/4 inch (+0 mm and -6mm) of the specified grade. The machine must cut vertical edges and have a positive method of dust control. The machine must have the ability to remove the millings or cuttings from the pavement and load them into a truck. All millings shall be removed and disposed of off the airport.

C. Clean-up. The Contractor shall sweep the milled surface daily and immediately after the milling until all residual materials are removed from the pavement surface. Prior to paving, the Contractor shall wet down the milled pavement and thoroughly sweep and/or blow the surface to remove loose residual material. Waste materials shall be collected and removed from the pavement surface and adjacent areas by sweeping or vacuuming. Waste materials shall be removed and disposed off Airport property.

101-3.6 Preparation of asphalt pavement surfaces prior to surface treatment. Existing asphalt pavements to be treated with a surface treatment shall be prepared as follows:

A. Patch asphalt pavement surfaces that have been softened by petroleum derivatives or have failed due to any other cause. Remove damaged pavement to the full depth of the damage and replace with new asphalt pavement similar to that of the existing pavement in accordance with paragraph 101-3.4b.

B. Repair joints and cracks in accordance with paragraph 101-3.2.

C. Remove oil or grease that has not penetrated the asphalt pavement by scrubbing with a detergent and washing thoroughly with clean water. After cleaning, treat these areas with an oil spot primer.

D. Clean pavement surface immediately prior to placing the surface treatment so that it is free of dust, dirt, grease, vegetation, oil or any type of objectionable surface film.

101-3.7 Maintenance. The Contractor shall perform all maintenance work necessary to keep the pavement in a satisfactory condition until the full section is complete and accepted by the RPR. The surface shall be kept clean and free from foreign material. The pavement shall be properly drained at all times. If cleaning is necessary or if the pavement becomes disturbed, any work repairs necessary shall be performed at the Contractor's expense.

101-3.8 Preparation of Joints in Rigid Pavement prior to resealing. Prior to application of sealant material, clean and dry the joints of all scale, dirt, dust, old sealant, curing compound, moisture and other foreign matter. The Contractor shall demonstrate, in the presence of the RPR, that the method used cleans the joint and does not damage the joint.

101-3.8.1 Removal of Existing Joint Sealant. All existing joint sealants will be removed by plowing or use of hand tools. Any remaining sealant and or debris will be removed by use of

wire brushes or other tools as necessary. Resaw joints removing no more than 1/16 inch (2 mm) from each joint face. Immediately after sawing, flush out joint with water and other tools as necessary to completely remove the slurry.

101-3.8.2 Cleaning prior to sealing. Immediately before sealing, joints shall be cleaned by removing any remaining laitance and other foreign material. Allow sufficient time to dry out joints prior to sealing. Joint surfaces will be surface-dry prior to installation of sealant.

101-3.8.3 Joint sealant. Joint material and installation will be in accordance with Item P-604.

101-3.9 Preparation of Cracks in Flexible Pavement prior to sealing. Prior to application of sealant material, clean and dry the joints of all scale, dirt, dust, old sealant, curing compound, moisture and other foreign matter. The Contractor shall demonstrate, in the presence of the RPR, that the method used cleans the cracks and does not damage the pavement.

101-3.9.1 Preparation of Crack. Widen crack with by removing a minimum of 1/16 inch (2 mm) from each side of crack. Immediately before sealing, cracks will be blown out with a hot air lance combined with oil and water-free compressed air.

101-3.9.2 Removal of Existing Crack Sealant. Existing sealants will be removed by random crack saw. Following sawing any remaining debris will be removed by use of a hot lance combined with oil and water-free compressed air.

101-3.9.3 Crack Sealant. Crack sealant material and installation will be in accordance with Item P-605.

101-3.9.4 Removal of Pipe and other Buried Structures.

a. **Removal of Existing Pipe Material.** Remove the types of pipe as indicated on the plans. The pipe material shall be legally disposed of off-site in a timely manner following removal. Trenches shall be backfilled with material equal to or better in quality than adjacent embankment. Trenches under paved areas must be compacted to 95% of ASTM D698.

b. **Removal of Inlets/Manholes.** Where indicated on the plans or as directed by the RPR, inlets and/or manholes shall be removed and legally disposed of off-site in a timely fashion after removal. Excavations after removal shall be backfilled with material equal or better in quality than adjacent embankment. When under paved areas must be compacted to 95% of ASTM D698, when outside of paved areas must be compacted to 95% of ASTM D698. Not used.

c. **Removal of Runway Lights and PAPIs.** Remove the existing runway threshold lights and PAPIs as indicated on the plans. The PAPIs and lights shall be protected from damage as to allow for reuse as indicated on the plans.

METHOD OF MEASUREMENT

101-4.1 Lump Sum. No separate measurement for payment will be made. The work covered by this section shall be considered as a subsidiary obligation of the Contractor and covered under the other contract items.

Measurement for the taxiway and access roadway removal shall be based on total demolition completed.

BASIS OF PAYMENT

101-5.1 Payment The work covered by this section shall be considered as a subsidiary obligation of the Contractor covered under the other contract items. No separate payment will be made. This shall be full compensation for furnishing all materials and for all preparation, hauling, and placing of the material and for all labor, equipment, tools, and incidentals necessary to complete this item.

The work completed as part of the Taxiway F and Secured Access Road removal shall be paid upon full demolition of the designated pavement areas. furnishing all materials and for all preparation, hauling, and placing of the material and for all labor, equipment, tools, and incidentals necessary to complete this item.

~~Item P-101-5.7 Removal of Pipe and other Buried Structures -Lump sum~~

Item P-101-1 Miscellaneous Pavement Removal --per Square Yard (SY)

REFERENCES

101-6.1 The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5380-6 Guidelines and Procedures for Maintenance of Airport Pavements.

ASTM International (ASTM)

ASTM D6690 Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements

END OF ITEM P-101

ITEM P-151

CLEARING AND GRUBBING

ITEM P-151, "CLEARING AND GRUBBING" is a technical specification contained in Federal Aviation Administration Advisory Circular – 150/5370-10H, "Standard Specifications for Construction of Airports."

This item has been modified to make allowances for local materials, methods and requirements. This item has been updated and modified to comply with the latest editions of other applicable codes, from knowledge gained on other airport construction projects and valuable lessons learned from airport maintenance staffs.

Deletions are noted by the ~~strikethrough~~ method.

Changes and additions are noted by the ***bold italic*** method.

ITEM P-151

CLEARING AND GRUBBING

DESCRIPTION

151-1.1 This item shall consist of clearing or clearing and grubbing, including the disposal of materials, for all areas within the limits designated on the plans or as required by the Engineer.

a. Clearing shall consist of the cutting and removal of all trees, stumps, brush, logs, hedges, the removal of fences and other loose or projecting material from the designated areas. The grubbing of stumps and roots will not be required.

b. Clearing and grubbing, shall consist of clearing the surface of the ground of the designated areas of all trees, stumps, down timber, logs, snags, brush, undergrowth, hedges, heavy growth of grass or weeds, fences, structures, debris, and rubbish of any nature, natural obstructions or such material which in the opinion of the Engineer is unsuitable for the foundation of strips, pavements, or other required structures, including the grubbing of stumps, roots, matted roots, foundations, and the disposal from the project of all spoil materials resulting from clearing and grubbing.

c. Tree Removal. Tree Removal shall consist of the cutting and removal of isolated single trees or isolated groups of trees, and the grubbing of stumps and roots. The removal of all the trees of this classification shall be in accordance with the requirements for the particular area being cleared.

CONSTRUCTION METHODS

151-2.1 General. The areas denoted on the plans to be cleared or cleared and grubbed shall be staked on the ground by the Contractor as indicated on the plans.

The removal of existing structures and utilities required to permit orderly progress of work shall be accomplished by local agencies, unless otherwise shown on the plans. Whenever a telephone pole, pipeline, conduit, sewer, roadway, or other utility is encountered and must be removed or relocated, the Contractor shall advise the RPR who will notify the proper local authority or owner to secure prompt action.

151-2.1.1 Disposal All materials removed by clearing or by clearing and grubbing shall be disposed of outside the Airport's limits at the Contractor's responsibility**,** except when otherwise directed by the RPR. As far as practicable, waste concrete and masonry shall be placed on slopes of embankments or channels. When embankments are constructed of such material, this material shall be placed in accordance with requirements for formation of embankments. Any broken concrete or masonry that cannot be used in construction and all other materials not considered suitable for use elsewhere, shall be disposed of by the Contractor. In no case, shall any discarded materials be left in windrows or piles adjacent to or within the airport limits. The manner and location of disposal of materials shall be subject to the approval of the RPR and shall not create an unsightly or objectionable view. When the Contractor is required to locate a disposal area outside the airport property limits, the Contractor shall obtain and file with the RPR permission in writing from the property owner for the use of private property for this purpose.

151-2.1.2 Blasting Blasting shall not be allowed.

151-2.2 Clearing. The Contractor shall clear the staked or indicated area of all materials as indicated on the plans. Trees unavoidably falling outside the specified clearing limits must be cut up, removed, and disposed of in a satisfactory manner. To minimize damage to trees that are to be left standing, trees shall be felled toward the center of the area being cleared. The Contractor shall preserve and protect from injury all trees not to be removed. The trees, stumps, and brush shall be cut flush with the original ground surface. The grubbing of stumps and roots will not be required.

Fences shall be removed and disposed of as directed by the RPR. Fence wire shall be neatly rolled and the wire and posts stored on the airport if they are to be used again, or stored at a location designated by the RPR if the fence is to remain the property of a local owner or authority.

151-2.3 Clearing and grubbing. In areas designated to be cleared and grubbed, all stumps, roots, buried logs, brush, grass, and other unsatisfactory materials as indicated on the plans, shall be removed, except where embankments exceeding 3-1/2 feet (105 cm) in depth will be constructed outside of paved areas. For embankments constructed outside of paved areas, all unsatisfactory materials shall be removed, but sound trees, stumps, and brush can be cut off flush with the original ground and allowed to remain. Tap roots and other projections over 1-1/2 inches (38 mm) in diameter shall be grubbed out to a depth of at least 18 inches (0.5 m) below the finished subgrade or slope elevation.

Any buildings and miscellaneous structures that are shown on the plans to be removed shall be demolished or removed, and all materials shall be disposed of by removal from the site. The cost of removal is incidental to this item. The remaining or existing foundations, wells, cesspools, and like structures shall be destroyed by breaking down the materials of which the foundations, wells, cesspools, etc., are built to a depth at least 2 feet (60 cm) below the existing surrounding ground. Any broken concrete, blocks, or other objectionable material that cannot be used in backfill shall be removed and disposed of at the Contractor’s expense. The holes or openings shall be backfilled with acceptable material and properly compacted.

All holes in embankment areas remaining after the grubbing operation shall have the sides of the holes flattened to facilitate filling with acceptable material and compacting as required in Item P-152. The same procedure shall be applied to all holes remaining after grubbing in areas where the depth of holes exceeds the depth of the proposed excavation.

METHOD OF MEASUREMENT

151-3.1 The quantities of clearing as shown by the limits on the plans shall be the number of acres (square meters) or fraction thereof of land specifically cleared.

151-3.2 The quantities of clearing and grubbing as shown by the limits on the plans shall be the number of acres (square meters) or fraction thereof of land specifically cleared and grubbed.

151-3.3 The quantity of tree removal as shown on the plans shall be the number of acres (square meters) or fraction thereof of land specifically cleared.

BASIS OF PAYMENT

151-4.1 Payment shall be made at the contract unit price per acre (square meter) or fraction thereof for clearing. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

151-4.2 Payment shall be made at the contract unit price per acre (square meter) or fraction thereof for clearing and grubbing. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete

151-4.3 Payment shall be made at the contract unit price per acre (square meter) for tree removal. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

~~Item P-151-4.1 Clearing -- per Acre (AC)~~

~~Item P-151-4.2 Clearing and grubbing --Per Acre (AC)~~

~~Item P-152-4.3 Tree Removal --per Acre (AC)~~

Item P-151-1 Stripping --per Square Yard (SY)

END OF ITEM P-151

ITEM P-152

EXCAVATION, SUBGRADE, AND EMBANKMENT

ITEM P-152, "EXCAVATION, SUBGRADE, AND EMBANKMENT" is a technical specification contained in Federal Aviation Administration Advisory Circular – 150/5370-10H, "Standard Specifications for Construction of Airports."

This item has been modified to make allowances for local materials, methods and requirements. This item has been updated and modified to comply with the latest editions of other applicable codes, from knowledge gained on other airport construction projects and valuable lessons learned from airport maintenance staffs.

Deletions are noted by the ~~strikethrough~~ method.

Changes and additions are noted by the ***bold italic*** method.

ITEM P-152

EXCAVATION, SUBGRADE, AND EMBANKMENT

DESCRIPTION

152-1.1 This item covers excavation, disposal, placement, and compaction of all materials within the limits of the work required to construct safety areas, runways, taxiways, aprons, and intermediate areas as well as other areas for drainage, building construction, parking, or other purposes in accordance with these specifications and in conformity to the dimensions and typical sections shown on the plans.

152-1.2 Classification. All material excavated shall be classified as defined below:

a. **Unclassified Excavation.** Unclassified excavation shall consist of the excavation and disposal of all material, regardless of its nature, which is not otherwise classified and paid for under the following items.

b. **Rock Excavation.** Rock excavation shall include all solid rock in ledges, in bedded deposits, in unstratified masses, and conglomerate deposits which are so firmly cemented they cannot be removed without blasting or using rippers. All boulders containing a volume of more than 1/2 cubic yard (0.4 cubic meter) will be classified as “rock excavation”.

c. **Muck Excavation:** Muck excavation shall consist of the removal and disposal of deposits or mixtures of soils and organic matter not suitable for foundation material. Muck shall include materials that will decay or produce subsidence in the embankment. It may be made up of decaying stumps, roots, logs, humus, or other material not satisfactory for incorporation in the embankment.

d. **Drainage Excavation:** Drainage excavation shall consist of all the excavation made for the primary purpose of drainage and includes drainage ditches, such as intercepting, inlet or outlet, temporary levee construction, or any other type as shown on the plans.

e. **Borrow Excavation.** Borrow excavation shall consist of approved material required for the construction of embankment or for other portions of the work in excess of the quantity of usable material available from required excavations. Borrow material shall be obtained from areas within the limits of the airport property but outside the normal limits of necessary grading, or from areas outside the airport.

152-1.3 Unsuitable Excavation. Unsuitable material shall be disposed in designated waste areas as shown on the plans. Materials containing vegetable or organic matter, such as muck, peat, organic silt, or sod shall be considered unsuitable for use in embankment construction. Material suitable for topsoil may be used on the embankment slope when approved by the RPR.

CONSTRUCTION METHODS

152-2.1 General. Before beginning excavation, grading, and embankment operations in any area, the area shall be cleared or cleared and grubbed in accordance with Item P-151.

The suitability of material to be placed in embankments shall be subject to approval by the RPR. All unsuitable material shall be disposed of in waste areas as shown on the plans. All waste areas shall be graded to allow positive drainage of the area and adjacent areas. The surface elevation of waste areas shall be specified on the plans or approved by the RPR.

When the Contractor's excavating operations encounter artifacts of historical or archaeological significance, the operations shall be temporarily discontinued and the RPR notified per Section 70, paragraph 70-20. At the direction of the RPR, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and allow for their removal. Such excavation will be paid for as extra work.

Areas outside the limits of the pavement areas where the top layer of soil has become compacted by hauling or other Contractor activities shall be scarified and disked to a depth of 4 inches (100 mm), to loosen and pulverize the soil. Stones or rock fragments larger than 4 inches (100 mm) in their greatest dimension will not be permitted in the top 6 inches (150 mm) of the subgrade.

If it is necessary to interrupt existing surface drainage, sewers or under-drainage, conduits, utilities, or similar underground structures, the Contractor shall be responsible for and shall take all necessary precautions to preserve them or provide temporary services. When such facilities are encountered, the Contractor shall notify the RPR, who shall arrange for their removal if necessary. The Contractor, at their own expense, shall satisfactorily repair or pay the cost of all damage to such facilities or structures that may result from any of the Contractor's operations during the period of the contract.

a. **Blasting.** Blasting shall not be allowed.

152-2.2 Excavation. No excavation shall be started until the work has been staked out by the Contractor and the RPR has obtained from the Contractor, the survey notes of the elevations and measurements of the ground surface. The Contractor and RPR shall agree that the original ground lines shown on the original topographic mapping are accurate, or agree to any adjustments made to the original ground lines.

All areas to be excavated shall be stripped of vegetation and topsoil. Topsoil shall be stockpiled for future use in areas designated on the plans or by the RPR. All suitable excavated material shall be used in the formation of embankment, subgrade, or other purposes **as** shown on the plans. All unsuitable material shall be disposed of as shown on the plans.

The grade shall be maintained so that the surface is well drained at all times.

When the volume of the excavation exceeds that required to construct the embankments to the grades as indicated on the plans, the excess shall be used to grade the areas of ultimate development or disposed as directed by the RPR. When the volume of excavation is not sufficient for constructing the embankments to the grades indicated, the deficiency shall be obtained from borrow areas.

a. **Selective grading.** When selective grading is indicated on the plans, the more suitable material designated by the RPR shall be used in constructing the embankment or in capping the pavement subgrade. If, at the time of excavation, it is not possible to place this material in its final location, it shall be stockpiled in approved areas until it can be placed. The more suitable material shall then be placed and compacted as specified. Selective grading shall be considered incidental to the work involved. The cost of stockpiling and placing the material shall be included in the various pay items of work involved.

b. **Undercutting.** Rock, shale, hardpan, loose rock, boulders, or other material unsatisfactory for safety areas, subgrades, roads, shoulders, or any areas intended for turf shall be excavated to a minimum depth of 12 inches (300 mm) below the subgrade or to the depth specified by the RPR. Muck, peat, matted roots, or other yielding material,

unsatisfactory for subgrade foundation, shall be removed to the depth specified. Unsuitable materials shall be disposed off the airport. The cost is incidental to this item. This excavated material shall be paid for at the contract unit price per cubic yard (per cubic meter) for Excavation, Subgrade and Embankment. The excavated area shall be backfilled with suitable material obtained from the grading operations or borrow areas and compacted to specified densities. The necessary backfill will constitute a part of the embankment. Where rock cuts are made, backfill with select material. Any pockets created in the rock surface shall be drained in accordance with the details shown on the plans. Undercutting will be paid as unclassified excavation.

c. **Over-break.** Over-break, including slides, is that portion of any material displaced or loosened beyond the finished work as planned or authorized by the RPR. All over-break shall be graded or removed by the Contractor and disposed of as directed by the RPR. The RPR shall determine if the displacement of such material was unavoidable and their own decision shall be final. Payment will not be made for the removal and disposal of over-break that the RPR determines as avoidable. Unavoidable over-break will be classified as "Unclassified Excavation."

d. **Removal of utilities.** The removal of existing structures and utilities required to permit the orderly progress of work will be accomplished by the Contractor as indicated on the plans. All existing foundations shall be excavated at least 2 feet (60 cm) below the top of subgrade or as indicated on the plans, and the material disposed of as directed by the RPR. All foundations thus excavated shall be backfilled with suitable material and compacted as specified for embankment or as shown on the plans.

152-2.3 Borrow excavation. Borrow areas within the airport property are indicated on the plans. Borrow excavation shall be made only at these designated locations and within the horizontal and vertical limits as staked or as directed by the RPR. All unsuitable material shall be disposed of by the Contractor as shown on the plans. All borrow pits shall be opened to expose the various strata of acceptable material to allow obtaining a uniform product. Borrow areas shall be drained and left in a neat, presentable condition with all slopes dressed uniformly. Borrow areas shall not create a hazardous wildlife attractant.

152-2.4 Drainage excavation. Drainage excavation shall consist of excavating drainage ditches including intercepting, inlet, or outlet ditches; or other types as shown on the plans. The work shall be performed in sequence with the other construction. Ditches shall be constructed prior to starting adjacent excavation operations. All satisfactory material shall be placed in embankment fills; unsuitable material shall be placed in designated waste areas or as directed by the RPR. All necessary work shall be performed true to final line, elevation, and cross-section. The Contractor shall maintain ditches constructed on the project to the required cross-section and shall keep them free of debris or obstructions until the project is accepted.

152-2.5 Preparation of cut areas or areas where existing pavement has been removed. In those areas on which a subbase or base course is to be placed, the top 12 inches (300 mm) of subgrade shall be compacted to not less than ~~100 %~~ ***95%*** of maximum density for non-cohesive soils, and ~~95%~~ ***90%*** of maximum density for cohesive soils as determined by ASTM D1557. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

152-2.6 Preparation of embankment area. All sod and vegetative matter shall be removed from the surface upon which the embankment is to be placed. The cleared surface shall be broken up

by plowing or scarifying to a minimum depth of 6 inches (150 mm) and shall then be compacted per paragraph 152-2.10.

Sloped surfaces steeper than one (1) vertical to four (4) horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches (300 mm) and compacted as specified for the adjacent fill.

No direct payment shall be made for the work performed under this section. The necessary clearing and grubbing and the quantity of excavation removed will be paid for under the respective items of work.

152-2.7 Control Strip. The first half-day of construction of subgrade and/or embankment shall be considered as a control strip for the Contractor to demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of this specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches (300 mm) upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted, or removed and replaced at the Contractor's expense. Full operations shall not begin until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved in advance by the RPR.

152-2.8 Formation of embankments. The material shall be constructed in lifts as established in the control strip, but not less than 6 inches (150 mm) nor more than 12 inches (300 mm) of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications.

The lifts shall be placed, to produce a soil structure as shown on the typical cross-section or as directed by the RPR. Materials such as brush, hedge, roots, stumps, grass and other organic matter, shall not be incorporated or buried in the embankment.

Earthwork operations shall be suspended at any time when satisfactory results cannot be obtained due to rain, freezing, or other unsatisfactory weather conditions in the field. Frozen material shall not be placed in the embankment nor shall embankment be placed upon frozen material. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. The Contractor shall drag, blade, or slope the embankment to provide surface drainage at all times.

The material in each lift shall be within ±2% of optimum moisture content before rolling to obtain the prescribed compaction. The material shall be moistened or aerated as necessary to achieve a uniform moisture content throughout the lift. Natural drying may be accelerated by blending in dry material or manipulation alone to increase the rate of evaporation.

The Contractor shall make the necessary corrections and adjustments in methods, materials or moisture content to achieve the specified embankment density.

The RPR will take samples of excavated materials which will be used in embankment for testing and develop a Moisture-Density Relations of Soils Report (Proctor) in accordance with ASTM D1557. A new Proctor shall be developed for each soil type based on visual classification.

Density tests will be taken by the RPR for every 3,000 square yards of compacted embankment for each lift which is required to be compacted, or other appropriate frequencies as determined by the RPR.

If the material has greater than 30% retained on the 3/4-inch (19.0 mm) sieve, follow AASHTO T-180 Annex Correction of maximum dry density and optimum moisture for oversized particles.

Rolling operations shall be continued until the embankment is compacted to not less than ~~100%~~ ***95%*** of maximum density for non-cohesive soils, and ~~95%~~ ***90%*** of maximum density for cohesive soils as determined by ASTM D1557. Under all areas to be paved, the embankments shall be compacted to a depth ~~of~~ and to a density ~~of not less than percent of the maximum density~~ ***as specified on the plans*** as determined by ASTM D1557. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

On all areas outside of the pavement areas, no compaction will be required on the top 4 inches (100 mm) which shall be prepared for a seedbed in accordance with Item T-901.

The in-place field density shall be determined in accordance with ASTM D1556. The RPR shall perform all density tests. If the specified density is not attained, the area represented by the test or as designated by the RPR shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

Compaction areas shall be kept separate, and no lift shall be covered by another lift until the proper density is obtained.

During construction of the embankment, the Contractor shall route all construction equipment evenly over the entire width of the embankment as each lift is placed. Lift placement shall begin in the deepest portion of the embankment fill. As placement progresses, the lifts shall be constructed approximately parallel to the finished pavement grade line.

When rock, concrete pavement, asphalt pavement, and other embankment material are excavated at approximately the same time as the subgrade, the material shall be incorporated into the outer portion of the embankment and the subgrade material shall be incorporated under the future paved areas. Stones, fragmentary rock, and recycled pavement larger than 4 inches (100 mm) in their greatest dimensions will not be allowed in the top 12 inches (300 mm) of the subgrade. Rockfill shall be brought up in lifts as specified or as directed by the RPR and the finer material shall be used to fill the voids forming a dense, compact mass. Rock, cement concrete pavement, asphalt pavement, and other embankment material shall not be disposed of except at places and in the manner designated on the plans or by the RPR.

When the excavated material consists predominantly of rock fragments of such size that the material cannot be placed in lifts of the prescribed thickness without crushing, pulverizing or further breaking down the pieces, such material may be placed in the embankment as directed in lifts not exceeding 2 feet (60 cm) in thickness. Each lift shall be leveled and smoothed with suitable

equipment by distribution of spalls and finer fragments of rock. The lift shall not be constructed above an elevation 4 feet (1.2 m) below the finished subgrade.

There will be no separate measurement of payment for compacted embankment. All costs incidental to placing in lifts, compacting, discing, watering, mixing, sloping, and other operations necessary for construction of embankments will be included in the contract price for excavation, borrow, or other items.

152-2.9 Proof rolling. The purpose of proof rolling the subgrade is to identify any weak areas in the subgrade and not for compaction of the subgrade. After compaction is completed, the subgrade area shall be proof rolled with a 15 ton (18.1 metric ton) Tandem axle Dual Wheel Dump Truck loaded to the legal limit with tires inflated to 125 psi (/0.862 MPa) in the presence of the RPR. Apply a minimum of 2,000 square yards coverage, or as specified by the RPR, under pavement areas. A coverage is defined as the application of one tire print over the designated area. Soft areas of subgrade that deflect more than 1 inch (25 mm) or show permanent deformation greater than 1 inch (25 mm) shall be removed and replaced with suitable material or reworked to conform to the moisture content and compaction requirements in accordance with these specifications. Removal and replacement of soft areas is incidental to this item.

152-2.10 Compaction requirements. The subgrade under areas to be paved shall be compacted to a depth ~~of~~ and to a density of not less than ~~percent of the maximum dry density~~ ***those specified in the plans and the approved foundation design,*** as determined by ASTM D1557. The subgrade in areas outside the limits of the pavement areas shall be compacted to a depth of 12 inches (300 mm) and to a density of not less than 90 percent of the maximum density as determined by ASTM D698.

The material to be compacted shall be within ±2% of optimum moisture content before being rolled to obtain the prescribed compaction (except for expansive soils). When the material has greater than 30 percent retained on the ¾ inch (19.0 mm) sieve, follow the methods in ASTM D1557. Tests for moisture content and compaction will be taken at a minimum of 3,000 S.Y. of subgrade. All quality assurance testing shall be done by the RPR.

The in-place field density shall be determined in accordance with ASTM D1556 or ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938 within 12 months prior to its use on this contract. The gage shall be field standardized daily.

Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

If the specified density is not attained, the entire lot shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

All cut-and-fill slopes shall be uniformly dressed to the slope, cross-section, and alignment shown on the plans or as directed by the RPR and the finished subgrade shall be maintained.

152-2.11 Finishing and protection of subgrade. Finishing and protection of the subgrade is incidental to this item. Grading and compacting of the subgrade shall be performed so that it will drain readily. All low areas, holes or depressions in the subgrade shall be brought to grade. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade shaped to the lines and grades shown on the plans. All ruts or rough places

that develop in the completed subgrade shall be graded, re-compacted, and retested. The Contractor shall protect the subgrade from damage and limit hauling over the finished subgrade to only traffic essential for construction purposes.

The Contractor shall maintain the completed course in satisfactory condition throughout placement of subsequent layers. No subbase, base, or surface course shall be placed on the subgrade until the subgrade has been accepted by the RPR.

152-2.12 Haul. All hauling will be considered a necessary and incidental part of the work. The Contractor shall include the cost in the contract unit price for the pay of items of work involved. No payment will be made separately or directly for hauling on any part of the work.

The Contractor's equipment shall not cause damage to any excavated surface, compacted lift or to the subgrade as a result of hauling operations. Any damage caused as a result of the Contractor's hauling operations shall be repaired at the Contractor's expense.

The Contractor shall be responsible for providing, maintaining and removing any haul roads or routes within or outside of the work area, and shall return the affected areas to their former condition, unless otherwise authorized in writing by the Owner. No separate payment will be made for any work or materials associated with providing, maintaining and removing haul roads or routes.

152-2.13 Surface Tolerances. In those areas on which a subbase or base course is to be placed, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (75 mm), reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. The Contractor shall perform all final smoothness and grade checks in the presence of the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor’s expense.

a. **Smoothness.** The finished surface shall not vary more than +/- ½ inch (12 mm) when tested with a 12-foot (3.7-m) straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.

b. **Grade.** The grade and crown shall be measured on a 50-foot (15-m) grid and shall be within +/-0.05 feet (15 mm) of the specified grade.

On safety areas, turfed areas and other designated areas within the grading limits where no subbase or base is to placed, grade shall not vary more than 0.10 feet (30 mm) from specified grade. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

152-2.14 Topsoil. When topsoil is specified or required as shown on the plans or under Item T-905, it shall be salvaged from stripping or other grading operations. The topsoil shall meet the requirements of Item T-905. If, at the time of excavation or stripping, the topsoil cannot be placed in its final section of finished construction, the material shall be stockpiled at approved locations. Stockpiles shall be located as shown on the plans and the approved CSPP, and shall not be placed on areas that subsequently will require any excavation or embankment fill. If, in the judgment of the RPR, it is practical to place the salvaged topsoil at the time of excavation or stripping, the material shall be placed in its final position without stockpiling or further re-handling.

Upon completion of grading operations, stockpiled topsoil shall be handled and placed as shown on the plans and as required in Item T-905. Topsoil shall be paid for as provided in Item T-905. No direct payment will be made for topsoil under Item P-152.

METHOD OF MEASUREMENT

152-3.1 The quantity of excavation to be paid for shall be the number of cubic yards (cubic meters) measured in its original position. Measurement shall not include the quantity of materials excavated without authorization beyond normal slope lines, or the quantity of material used for purposes other than those directed.

152-3.2 Borrow material shall be paid for on the basis of the number of cubic yards (cubic meters) measured in its original position at the borrow pit.

152-3.3 Stockpiled material shall be paid for on the basis of the number of cubic yards (cubic meters) measured in the stockpiled position.

152-3.4 The quantity of embankment in place shall be the number of cubic yards (cubic meters) measured in its final position.

BASIS OF PAYMENT

152-4.1 ***Excavation, Subgrade, and Embankment*** payment shall be made at the contract unit price per cubic yard (cubic meter). This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-152-1	***Excavation and Embankment***	***--per Lump Sum (LS)***
Item P-152-2	***Subgrade Preparation (LBR 40)***	***-per Square Yard (SY)***

REFERENCES

152-5.1 The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO T-180 Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop

ASTM International (ASTM)

ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))

ASTM D1556 Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2700 kN-m/m^3))

ASTM D6938 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Advisory Circulars (AC)
AC 150/5370-2 Operational Safety on Airports During Construction Software

Software
FAARFIELD – FAA Rigid and Flexible Iterative Elastic Layered Design

U.S. Department of Transportation
FAA RD-76-66 Design and Construction of Airport Pavements on Expansive Soils

END OF ITEM P-152

Item P-154

SUBBASE COURSE

ITEM P-154, "SUBBASE COURSE" is a technical specification contained in Federal Aviation Administration Advisory Circular – 150/5370-10H, "Standard Specifications for Construction of Airports."

This item has been modified to make allowances for local materials, methods and requirements. This item has been updated and modified to comply with the latest editions of other applicable codes, from knowledge gained on other airport construction projects and valuable lessons learned from airport maintenance staffs.

Deletions are noted by the ~~strikethrough~~ method.

Changes and additions are noted by the ***bold italic*** method.

Item P-154

SUBBASE COURSE

DESCRIPTION

154-1.1 This item shall consist of a subbase course composed of granular materials constructed on a prepared subgrade or underlying course in accordance with these specifications, and in conformity with the dimensions and typical cross-section shown on the plans.

MATERIALS

154-2.1 Materials. The subbase material shall consist of hard durable particles or fragments of granular aggregates. The material may be obtained from gravel pits, stockpiles, or may be produced from a crushing and screening plant with proper blending. The materials from these sources shall meet the requirements for gradation, quality, and consistency. The material shall be free from vegetative matter, excessive amounts of clay, and other objectionable substances; uniformly blended; and be capable of being compacted into a dense, stable subbase.

The subbase material shall exhibit a California Bearing Ratio (CBR) value of at least 20 when tested in accordance with ASTM D1883. The subbase material shall meet the gradation specified in the table below.

Subbase Gradation Requirements

Sieve designation	Percentage by weight passing sieves	Job Control Grading Band Tolerances[1] (Percent)
3 inch (75 mm)	100	0
3/4 inch (19.0 mm)	70-100	±10
No. 10 (2.00 mm)	20-100	±10
No. 40 (425 µm)	5-60	±5
No. 200 (75 µm)	0-15	±5

[1] The “Job Control Grading Band Tolerances” shall be applied to “Contractor’s Final Gradation” to establish the job control grading band.

The portion of the material passing the No. 40 (425 µm) sieve shall have a liquid limit of not more than 25 and a plasticity index of not more than six (6) when tested in accordance with ASTM D4318.

154-2.2 Sampling and testing.

a. **Aggregate base materials.** Samples shall be taken by the Contractor per ASTM D75 for initial aggregate subbase requirements and gradation. Material shall meet the requirements in paragraphs 154-2.1. The Contractor shall submit to the Resident Project Representative (RPR) certified test results showing that the aggregate meets the Material requirements of this section. Tests shall be representative of the material to be used for the project.

b. **Gradation requirements.** The Contractor shall take at least one aggregate subbase sample per day in the presence of the RPR to check the final gradation. Samples shall be taken from the in-place, un-compacted material at sampling locations determined by the RPR on a random basis per ASTM D3665. Sampling shall be per ASTM D75 and tested

per ASTM C136 and ASTM C117. Results shall be furnished to the RPR by the Contractor each day during construction. Material shall meet the requirements in paragraph 154-2.1.

154-2.3 Separation Geotextile. Not used.

154-2.4 Geogrid. Not used.

CONSTRUCTION METHODS

154-3.1 General. The subbase course shall be placed where designated on the plans or as directed by the Engineer. The material shall be shaped and thoroughly compacted within the tolerances specified.

Granular subbases which, due to grain sizes or shapes, are not sufficiently stable to support the construction equipment without movement, shall be mechanically modified to the depth necessary to provide stability as directed by the RPR. The mechanical modification shall include the addition of a fine-grained medium to bind the particles of the subbase material sufficiently to furnish a bearing strength, so the course will not deform under construction equipment traffic.

154-3.2 Preparing underlying course. Prior to constructing the subbase course, clean the underlying course or subgrade of all foreign substances. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances in accordance with Item P-152. Correct ruts, soft yielding spots in the underlying courses, and subgrade areas having inadequate compaction and/or deviations of the surface from the specified requirements, by loosening and removing soft or unsatisfactory material, adding approved material, reshaping to line and grade, and recompacting to specified density requirements. For cohesionless underlying courses or subgrades containing sands or gravels, as defined in ASTM D2487, the surface shall be stabilized prior to placement of the overlying course by mixing the overlying course material into the underlying course, and compacting by approved methods. The stabilized material shall be considered as part of the underlying course and shall meet all requirements for the underlying course. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained in a satisfactory condition until the overlying course is placed. The underlying course shall be checked and accepted by the RPR before placing and spreading operations are started.

To protect the subgrade and to ensure proper drainage, spreading of the subbase shall begin along the centerline of the pavement on a crowned section or on the high side of pavements with a one-way slope.

154-3.3 Control Strip. The first half-day of subbase construction shall be considered as a control strip for the Contractor to demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of this specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches (300 mm) upon the Contractor’s demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted, or removed and replaced at the Contractor’s expense. Full operations shall not begin until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved in advance by the RPR.

154-3.4 Placement. The material shall be placed and spread on the prepared underlying layer by spreader boxes or other devices as approved by the RPR, to a uniform thickness and width. The equipment shall have positive thickness controls to minimize the need for additional manipulation of the material. Dumping from vehicles that require re-handling shall not be permitted. Hauling over the uncompacted base course shall not be permitted. The material shall not be placed when the underlying course is soft or yielding.

The material shall meet gradation and moisture requirements prior to compaction. Material may be free-draining and the minimum moisture content shall be established for placement and compaction of the material.

The material shall be constructed in lifts as established in the control strip, but not less than 4 inches (100 mm) nor more than 12 inches (300 mm) of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications.

154-3.5 Compaction. The subbase material shall be compacted, adjusting moisture as necessary, to be within ±2% of optimum moisture. The field density of the compacted material shall be at least 95% of the maximum density as specified in paragraph 154-3.9a. If the specified density is not attained, the area of the lift represented by the test shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

154-3.6 Weather limitation. Material shall not be placed unless the ambient air temperature is at least 40°F (4°C) and rising. Work on subbase course shall not be conducted when the subgrade is wet or frozen or the subbase material contains frozen material.

154-3.7 Maintenance. No base or surface course shall be placed on the subbase until the subbase has been accepted by the RPR. The Contractor shall maintain the completed course in satisfactory condition throughout placement of subsequent layers. When material has been exposed to excessive rain, snow, or freeze-thaw conditions, the Contractor shall verify that materials still meet all specification requirements before placement of additional material. Equipment may be routed over completed sections of subbase course, provided the equipment does not damage the subbase course and the equipment is routed over the full width of the completed subbase course. Any damage to the subbase course from routing equipment over the subbase course shall be repaired by the Contractor at their expense.

154-3.8 Surface tolerance. In those areas on which a subbase or base course is to be placed, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (75 mm), reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. The Contractor shall perform all final smoothness and grade checks in the presence of the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense.

a. **Smoothness.** The finished surface shall not vary more than +/- ½ inch (12 mm) when tested with a 12-foot (3.7-m) straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.

b. Grade. The grade and crown shall be measured on a 50-foot (15-m) grid and shall be within +/-0.05 feet (15 mm) of the specified grade.

154-3.9 Acceptance sampling and testing. The aggregate base course shall be accepted for density and thickness on an area basis. Two test shall be made for density and thickness for each 1200 square yards (1000 square meters). Sampling locations will be determined on a random basis per ASTM D3665.

a. Density. The RPR shall perform all density tests.

Each area shall be accepted for density when the field density is at least 95% of the maximum density of laboratory specimens compacted and tested per ASTM D698. The in-place field density shall be determined per ASTM D1556 or ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. If the specified density is not attained, the area represented by the failed test shall be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

When the material has greater than 30 percent retained on the ¾ inch (19.0 mm) sieve, use methods in ASTM D698 and the procedures in AASHTO T180 Annex for correction of maximum dry density and optimum moisture for oversized particles.

b. Thickness. The thickness of the base course shall be within +0 and -1/2 inch (12 mm) of the specified thickness as determined by depth tests taken by the Contractor in the presence of the RPR for each area. Where the thickness is deficient by more than 1/2-inch (12 mm), the Contractor shall correct such areas at no additional cost by scarifying to a depth of at least 3 inches (75 mm), adding new material of proper gradation, and the material shall be blended and recompacted to grade. The Contractor shall replace, at his expense, base material where depth tests have been taken.

METHOD OF MEASUREMENT

154-4.1 Subbase course shall be measured by the number of square yards (square meters) of subbase course material placed and compacted to specified density and plan thickness requirements in the completed course. The quantity of subbase course material shall be measured in final position based upon On individual depth measurements, thicknesses more than 1/2 inch (12 mm) in excess of that shown on the plans shall be considered as the specified thickness plus 1/2 inch (12 mm) in computing the yardage for payment. Subbase materials shall not be included in any other excavation quantities.

BASIS OF PAYMENT

154-5.1 Payment shall be made at the contract unit price per square yard (square meter) for subbase course. This price shall be full compensation for furnishing all materials; for all preparation, hauling, and placing of these materials; and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

~~Item P-154-5.1 Subbase Course Per Square Yard (Square Meter)~~

Item P-154-1 Stabilized Subbase Course (12") -per Square Yard (SY)

REFERENCES

154-6.1 The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C117 Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing

ASTM C136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

ASTM D75 Standard Practice for Sampling Aggregates

ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))

ASTM D1556 Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3))

ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

ASTM D4253 Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table

ASTM D4759 Practice for Determining the Specification Conformance of Geosynthetics

ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D6938 Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

American Association of State Highway and Transportation Officials (AASHTO)

M 288 Geotextile Specification for Highway Applications

END OF ITEM P-154

ITEM P-209

CRUSHED AGGREGATE BASE COURSE

ITEM P-209, "CRUSHED AGGREGATE BASE COURSE" is a technical specification contained in Federal Aviation Administration Advisory Circular – 150/5370-10H, "Standard Specifications for Construction of Airports."

This item has been modified to make allowances for local materials, methods and requirements. This item has been updated and modified to comply with the latest editions of other applicable codes, from knowledge gained on other airport construction projects and valuable lessons learned from airport maintenance staffs.

Deletions are noted by the ~~strikethrough~~ method.

Changes and additions are noted by the ***bold italic*** method.

ITEM P-209

CRUSHED AGGREGATE BASE COURSE

DESCRIPTION

209-1.1 This item consists of a base course composed of crushed aggregate base constructed on a prepared course in accordance with these specifications and in conformity to the dimensions and typical cross-sections shown on the plans.

MATERIALS

209-2.1 Crushed Aggregate Base. Crushed aggregate shall consist of clean, sound, durable particles of crushed stone, crushed gravel, or crushed slag and shall be free from coatings of clay, silt, organic material, clay lumps or balls or other deleterious materials or coatings. The method used to produce the crushed gravel shall result in the fractured particles in the finished product as consistent and uniform as practicable. Fine aggregate portion, defined as the portion passing the No. 4 (4.75 mm) sieve shall consist of fines from the coarse aggregate crushing operation. The fine aggregate shall be produced by crushing stone, gravel, or slag that meet the coarse aggregate requirements for wear and soundness. Aggregate base material requirements are listed in the following table.

Crushed Aggregate Base Material Requirements

Material Test	Requirement	Standard
Coarse Aggregate		
Resistance to Degradation	Loss: 45% maximum	ASTM C131
Soundness of Aggregates by Use of Sodium Sulfate **or** Magnesium Sulfate	Loss after 5 cycles: 12% maximum using Sodium sulfate - or - 18% maximum using magnesium sulfate	ASTM C88
Percentage of Fractured Particles	Minimum 90% by weight of particles with at least two fractured faces and 100% with at least one fractured face[1]	ASTM D5821
Flat Particles, Elongated Particles, or Flat and Elongated Particles	10% maximum, by weight, of flat, elongated, or flat and elongated particles [2]	ASTM D4791
Bulk density of slag	Weigh not less than 70 pounds per cubic foot (1.12 Mg/cubic meter)	ASTM C29
Clay lumps and friable particles	Less than or equal to 3 percent	ASTM C142
Fine Aggregate		
Liquid limit	Less than or equal to 25	ASTM D4318
Plasticity Index	Not more than five (5)	ASTM D4318

[1] The area of each face shall be equal to at least 75% of the smallest mid-sectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces.

[2] A flat particle is one having a ratio of width to thickness greater than five (5); an elongated particle is one having a ratio of length to width greater than five (5).

209-2.2 Gradation Requirements. The gradation of the aggregate base material shall meet the requirements of the gradation given in the following table when tested per ASTM C117 and ASTM

C136. The gradation shall be well graded from coarse to fine and shall not vary from the lower limit on one sieve to the high limit on an adjacent sieve or vice versa.

Gradation of Aggregate Base

Sieve Size	Design Range Percentage by Weight passing	Contractor's Final Gradation	Job Control Grading Band Tolerances[1] (Percent)
2 inch (50 mm)	100		0
1-1/2 inch (37.5 mm)	95-100		±5
1 inch (25.0 mm)	70-95		±8
3/4 inch (19.0 mm)	55-85		±8
No. 4 (4.75 mm)	30-60		±8
No. 40[2] (425 µm)	10-30		±5
No. 200[2] (75 µm)	0-10		±3

[1] The "Job Control Grading Band Tolerances for Contractor's Final Gradation" in the table shall be applied to "Contractor's Final Gradation" to establish a job control grading band. The full tolerance still applies if application of the tolerances results in a job control grading band outside the design range.

[2] The fraction of material passing the No 200 (75 µm) sieve shall not exceed two-thirds the fraction passing the No 40 (425 µm) sieve.

209-2.3 Sampling and Testing.

a. Aggregate base materials. The Contractor shall take samples of the aggregate base in accordance with ASTM D75 to verify initial aggregate base requirements and gradation. Material shall meet the requirements in paragraph 209-2.1. This sampling and testing will be the basis for approval of the aggregate base quality requirements.

b. Gradation Requirements. The Contractor shall take at least two aggregate base samples per day in the presence of the Resident Project Representative (RPR) to check the final gradation. Sampling shall be per ASTM D75. Material shall meet the requirements in paragraph 209-2.2. The samples shall be taken from the in-place, un-compacted material at sampling points and intervals designated by the RPR.

209-2.4 Separation Geotextile. Not used

CONSTRUCTION METHODS

209-3.1 Control strip. The first half-day of construction shall be considered the control strip. The Contractor shall demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of the specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches (300 mm) upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted or removed and replaced at the Contractor's expense. Full operations shall not continue until the control strip has been accepted by the RPR. The Contractor shall use the same equipment,

materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved by the RPR.

209-3.2 Preparing Underlying Subgrade and/or Subbase. The underlying subgrade and/or subbase shall be checked and accepted by the RPR before base course placing and spreading operations begin. Re-proof rolling of the subgrade or proof rolling of the subbase in accordance with Item P-152, at the Contractor's expense, may be required by the RPR if the Contractor fails to ensure proper drainage or protect the subgrade and/or subbase. Any ruts or soft, yielding areas due to improper drainage conditions, hauling, or any other cause, shall be corrected before the base course is placed. To ensure proper drainage, the spreading of the base shall begin along the centerline of the pavement on a crowned section or on the high side of the pavement with a one-way slope.

209-3.3 Production. The aggregate shall be uniformly blended and, when at a satisfactory moisture content per paragraph 209-3.5, the approved material may be transported directly to the placement.

209-3.4 Placement. The aggregate shall be placed and spread on the prepared underlying layer by spreader boxes or other devices as approved by the RPR, to a uniform thickness and width. The equipment shall have positive thickness controls to minimize the need for additional manipulation of the material. Dumping from vehicles that require re-handling shall not be permitted. Hauling over the uncompacted base course shall not be permitted.

The aggregate shall meet gradation and moisture requirements prior to compaction. The base course shall be constructed in lifts as established in the control strip, but not less than 4 inches (100 mm) nor more than 12 inches (300 mm) of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications at the Contractor's expense.

209-3.5 Compaction. Immediately after completion of the spreading operations, compact each layer of the base course, as specified, with approved compaction equipment. The number, type, and weight of rollers shall be sufficient to compact the material to the required density within the same day that the aggregate is placed on the subgrade.

The field density of each compacted lift of material shall be at least 100% of the maximum density of laboratory specimens prepared from samples of the subbase material delivered to the jobsite. The laboratory specimens shall be compacted and tested in accordance with ASTM D1557. The moisture content of the material during placing operations shall be within ±2 percentage points of the optimum moisture content as determined by ASTM D1557. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

209-3.6 Weather Limitations. Material shall not be placed unless the ambient air temperature is at least 40°F (4°C) and rising. Work on base course shall not be conducted when the subgrade or subbase is wet or frozen or the base material contains frozen material.

209-3.7 Maintenance. The base course shall be maintained in a condition that will meet all specification requirements. When material has been exposed to excessive rain, snow, or freeze-thaw conditions, prior to placement of additional material, the Contractor shall verify that materials still meet all specification requirements. Equipment may be routed over completed sections of

base course, provided that no damage results and the equipment is routed over the full width of the completed base course. Any damage resulting to the base course from routing equipment over the base course shall be repaired by the Contractor at the Contractor's expense.

209-3.8 Surface Tolerances. After the course has been compacted, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (75 mm), reshaped and recompacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense. The smoothness and accuracy requirements specified here apply only to the top layer when base course is constructed in more than one layer.

a. **Smoothness.** The finished surface shall not vary more than 3/8-inch (9 mm) when tested with a 12-foot (3.7-m) straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.

b. **Grade.** The grade and crown shall be measured on a 50-foot (15-m) grid and shall be within +0 and -1/2 inch (12 mm) of the specified grade.

209-3.9 Acceptance Sampling and Testing. Crushed aggregate base course shall be accepted for density and thickness on an area basis. Two tests shall be made for density and thickness for each **[** 1200 square yds (1000 m^2) **]**. Sampling locations will be determined on a random basis per ASTM D3665

a. **Density.** The Contractor's laboratory shall perform all density tests in the RPR's presence and provide the test results upon completion to the RPR for acceptance.

   Each area shall be accepted for density when the field density is at least 100% of the maximum density of laboratory specimens compacted and tested per ASTM 1557. The in-place field density shall be determined per ASTM D1556 or ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938.. If the specified density is not attained, the area represented by the failed test must be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

b. **Thickness.** Depth tests shall be made by test holes at least 3 inches (75 mm) in diameter that extend through the base. The thickness of the base course shall be within +0 and -1/2 inch (12 mm) of the specified thickness as determined by depth tests taken by the Contractor in the presence of the RPR for each area. Where the thickness is deficient by more than 1/2-inch (12 mm), the Contractor shall correct such areas at no additional cost by scarifying to a depth of at least 3 inches (75 mm), adding new material of proper gradation, and the material shall be blended and recompacted to grade. The Contractor shall replace, at his expense, base material where depth tests have been taken.

METHOD OF MEASUREMENT

209-4.1 The quantity of crushed aggregate base course will be determined by measurement of the number of square yards (square meters) of material actually constructed and accepted by the RPR as complying with the plans and specifications. Base materials shall not be included in any other excavation quantities.

BASIS OF PAYMENT

209-5.1 Payment shall be made at the contract unit price per square yard (square meter) for crushed aggregate base course. This price shall be full compensation for furnishing all materials, for preparing and placing these materials, and for all labor, equipment tools, and incidentals necessary to complete the item.

Payment will be made under:

~~Item P-209-5.1 Crushed Aggregate Base Course - per square yard (square meter)~~

Item P-209-1 8" Crushed Aggregate Base Course -per Square Yard (SY)

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C29	Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2700 kN-m/m^3))
ASTM D2167	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate

ASTM D3665 Standard Practice for Random Sampling of Construction Materials

ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D4491 Standard Test Methods for Water Permeability of Geotextiles by Permittivity

ASTM D4643 Standard Test Method for Determination of Water Content of Soil and Rock by Microwave Oven Heating

ASTM D4751 Standard Test Methods for Determining Apparent Opening Size of a Geotextile

ASTM D4791 Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate

ASTM D5821 Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate

ASTM D6938 Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

ASTM D7928 Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis

American Association of State Highway and Transportation Officials (AASHTO)

M288 Standard Specification for Geosynthetic Specification for Highway Applications

END OF ITEM P-209

ITEM P-401

ASPHALT MIX PAVEMENT

ITEM P-401, "ASPHALT MIX PAVEMENT" is a technical specification contained in Federal Aviation Administration Advisory Circular – 150/5370-10H, "Standard Specifications for Construction of Airports."

This item has been modified to make allowances for local materials, methods and requirements. This item has been updated and modified to comply with the latest editions of other applicable codes, from knowledge gained on other airport construction projects and valuable lessons learned from airport maintenance staffs.

Deletions are noted by the ~~strikethrough~~ method.

Changes and additions are noted by the ***bold italic*** method.

ITEM P-401

ASPHALT MIX PAVEMENTS

DESCRIPTION

401-1.1 This item shall consist of pavement courses composed of mineral aggregate and asphalt binder mixed in a central mixing plant and placed on a prepared base or stabilized course in accordance with these specifications and shall conform to the lines, grades, thicknesses, and typical cross-sections shown on the plans. Each course shall be constructed to the depth, typical section, and elevation required by the plans and shall be rolled, finished, and approved before the placement of the next course.

MATERIALS

401-2.1 Aggregate. Aggregates shall consist of crushed stone, crushed gravel, crushed slag, screenings, natural sand, and mineral filler, as required. The aggregates should have no known history of detrimental pavement staining due to ferrous sulfides, such as pyrite. Coarse aggregate is the material retained on the No. 4 (4.75 mm) sieve. Fine aggregate is the material passing the No. 4 (4.75 mm) sieve.

a. Coarse Aggregate. Coarse aggregate shall consist of sound, tough, durable particles, free from films of matter that would prevent thorough coating and bonding with the asphalt material and free from organic matter and other deleterious substances. Coarse aggregate material requirements are given in the table below.

Coarse Aggregate Material Requirements

Material Test	Requirement	Standard
Resistance to Degradation	Loss: 40% maximum	ASTM C131
Soundness of Aggregates by Use of Sodium Sulfate **or** Magnesium Sulfate	Loss after 5 cycles: 12% maximum using Sodium sulfate - or - 18% maximum using magnesium sulfate	ASTM C88
Clay lumps and friable particles	0.3% maximum	ASTM C142
Percentage of Fractured Particles	For pavements designed for aircraft gross weights of 60,000 pounds (27200 kg) or more: Minimum 75% by weight of particles with at least two fractured faces and 85% with at least one fractured face[1]	ASTM D5821
	For pavements designed for aircraft gross weights less than 60,000 pounds (27200 kg): Minimum 50% by weight of particles with at least two fractured faces and 65% with at least one fractured face[1]	
Flat, Elongated, or Flat and Elongated Particles	8% maximum, by weight, of flat, elongated, or flat and elongated particles at 5:1 [2]	ASTM D4791
Bulk density of slag [3]	Weigh not less than 70 pounds per cubic foot (1.12 Mg/cubic meter)	ASTM C29.

[1] The area of each face shall be equal to at least 75% of the smallest mid-sectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces.

[2] A flat particle is one having a ratio of width to thickness greater than five (5); an elongated particle is one having a ratio of length to width greater than five (5).

[3] Only required if slag is specified.

Fine Aggregate. Fine aggregate shall consist of clean, sound, tough, durable, angular shaped particles produced by crushing stone, slag, or gravel and shall be free from coatings of clay, silt, or other objectionable matter. Natural (non-manufactured) sand may be used to obtain the gradation of the fine aggregate blend or to improve the workability of the mix. Fine aggregate material requirements are listed in the table below

Fine Aggregate Material Requirements

Material Test	Requirement	Standard
Liquid limit	25 maximum	ASTM D4318
Plasticity Index	4 maximum	ASTM D4318
Soundness of Aggregates by Use of Sodium Sulfate **or** Magnesium Sulfate	Loss after 5 cycles: 10% maximum using Sodium sulfate - or - 15% maximum using magnesium sulfate	ASTM C88
Clay lumps and friable particles	0.3% maximum	ASTM C142
Sand equivalent	45 minimum	ASTM D2419

b. Sampling. ASTM D75 shall be used in sampling coarse and fine aggregate.

401-2.2 Mineral Filler. Mineral filler (baghouse fines) may be added in addition to material naturally present in the aggregate. Mineral filler shall meet the requirements of ASTM D242.

Mineral Filler Requirements

Material Test	Requirement	Standard
Plasticity Index	4 maximum	ASTM D4318

401-2.3 Asphalt Binder. Asphalt binder shall conform to ASTM D6373 Performance Grade (PG) 76-22.

401-2.4 Anti-Stripping Agent. Any anti-stripping agent or additive (anti-strip) shall be heat stable and shall not change the asphalt binder grade beyond specifications. Anti-strip shall be an approved material of the Department of Transportation of the State in which the project is located.

COMPOSITION

401-3.1 Composition of Mixture(s). The asphalt mix shall be composed of a mixture of aggregates, filler and anti-strip agent if required, and asphalt binder. The aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF).

401-3.2 Job Mix Formula (JMF) Laboratory. The laboratory used to develop the JMF shall possess a current certificate of accreditation, listing D3666 from a national accrediting authority

and all test methods required for developing the JMF; and be listed on the accrediting authority's website. A copy of the laboratory's current accreditation and accredited test methods shall be submitted to the Resident Project Representative (RPR) prior to start of construction.

401-3.3 Job Mix Formula (JMF). No asphalt mixture shall be placed until an acceptable mix design has been submitted to the RPR for review and accepted in writing. The RPR's review shall not relieve the Contractor of the responsibility to select and proportion the materials to comply with this section.

When the project requires asphalt mixtures of differing aggregate gradations and/or binders, a separate JMF shall be submitted for each mix. Add anti-stripping agent to meet tensile strength requirements.

The JMF shall be prepared by an accredited laboratory that meets the requirements of paragraph 401-3.2. The asphalt mixture shall be designed using procedures contained in Asphalt Institute MS-2 Mix Design Manual, 7th Edition**.** Samples shall be prepared and compacted using the gyratory compactor in accordance with ASTM D6925.

Should a change in sources of materials be made, a new JMF must be submitted to the RPR for review and accepted in writing before the new material is used. After the initial production JMF has been approved by the RPR and a new or modified JMF is required for whatever reason, the subsequent cost of the new or modified JMF, including a new control strip when required by the RPR, will be borne by the Contractor.

The RPR may request samples at any time for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

The JMF shall be submitted in writing by the Contractor at least 15 days prior to the start of paving operations. The JMF shall be developed within the same construction season using aggregates proposed for project use.

The JMF shall be dated, and stamped or sealed by the responsible professional Engineer of the laboratory and shall include the following items as a minimum:

- Manufacturer's Certificate of Analysis (COA) for the asphalt binder used in the JMF in accordance with paragraph 401-2.3. Certificate of asphalt performance grade is with modifier already added, if used and must indicate compliance with ASTM D6373. For plant modified asphalt binder, certified test report indicating grade certification of modified asphalt binder.

- Manufacturer's Certificate of Analysis (COA) for the anti-stripping agent if used in the JMF in accordance with paragraph 401-2.4.

- Certified material test reports for the course and fine aggregate and mineral filler in accordance with paragraphs 401-2.1.

- Percent passing each sieve size for individual gradation of each aggregate cold feed and/or hot bin; percent by weight of each cold feed and/or hot bin used; and the total combined gradation in the JMF.

- Specific Gravity and absorption of each coarse and fine aggregate.

- Percent natural sand.
- Percent fractured faces.
- Percent by weight of flat particles, elongated particles, and flat and elongated particles (and criteria).
- Percent of asphalt.
- Number of blows or gyrations
- Laboratory mixing and compaction temperatures.
- Supplier-recommended field mixing and compaction temperatures.
- Plot of the combined gradation on a 0.45 power gradation curve.
- Graphical plots of air voids, voids in the mineral aggregate (VMA), and unit weight versus asphalt content. To achieve minimum VMA during production, the mix design needs to account for material breakdown during production.
- Tensile Strength Ratio (TSR).
- Type and amount of Anti-strip agent when used.
- Asphalt Pavement Analyzer (APA) results.
- Date the JMF was developed. Mix designs that are not dated or which are from a prior construction season shall not be accepted.

Table 1. Asphalt Design Criteria

Test Property	Value	Test Method
Number of blows or gyrations	75	
Air voids (%)	3.5	ASTM D3203
Percent voids in mineral aggregate (VMA), minimum	See Table 2	ASTM D6995
Tensile Strength Ratio (TSR)[1]	not less than 80 at a saturation of 70-80%	ASTM D4867
Asphalt Pavement Analyzer (APA)[2]	Less than 10 mm @ 4000 passes	AASHTO T340 at 250 psi hose pressure at 64°C test temperature

[1] Test specimens for TSR shall be compacted at 7 ± 1.0 % air voids. In areas subject to freeze-thaw, use freeze-thaw conditioning in lieu of moisture conditioning per ASTM D4867.

[2] AASHTO T340 at 100 psi hose pressure at 64°C test temperature may be used in the interim. If this method is used the required Value shall be less than 5 mm @ 8000 passes

The mineral aggregate shall be of such size that the percentage composition by weight, as determined by laboratory sieves, will conform to the gradation or gradations specified in Table 2 when tested in accordance with ASTM C136 and ASTM C117.

The gradations in Table 2 represent the limits that shall determine the suitability of aggregate for use from the sources of supply; be well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve, or vice versa.

Table 2. Aggregate - Asphalt Pavements

Sieve Size	Percentage by Weight Passing Sieve
1 inch (25.0 mm)	--
3/4 inch (19.0 mm)	100
1/2 inch (12.5 mm)	90-100
3/8 inch (9.5 mm)	72-88
No. 4 (4.75 mm)	53-73
No. 8 (2.36 mm)	38-60
No. 16 (1.18 mm)	26-48
No. 30 (600 µm)	18-38
No. 50 (300 µm)	11-27
No. 100 (150 µm)	6-18
No. 200 (75 µm)	3-6
Minimum Voids in Mineral Aggregate (VMA)[1]	15.0
Asphalt Percent:	
Stone or gravel	5.0-7.5
Slag	6.5-9.5
Recommended Minimum Construction Lift Thickness	2

[1] To achieve minimum VMA during production, the mix design needs to account for material breakdown during production.

The aggregate gradations shown are based on aggregates of uniform specific gravity. The percentages passing the various sieves shall be corrected when aggregates of varying specific gravities are used, as indicated in the Asphalt Institute MS-2 Mix Design Manual, 7th Edition.

401-3.4 Reclaimed asphalt pavement (RAP). RAP shall not be used.

401-3.5 Control Strip. A control strip is not required.

CONSTRUCTION METHODS

401-4.1 Weather Limitations. The asphalt shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 4. The temperature requirements may be waived by the RPR, if requested; however, all other requirements including compaction shall be met.

Table 4. Surface Temperature Limitations of Underlying Course

Mat Thickness	Base Temperature (Minimum)	
	°F	°C
3 inches (7.5 cm) or greater	40 [1]	4

Mat Thickness	Base Temperature (Minimum)	
	°F	°C
Greater than 2 inches (50 mm)but less than 3 inches (7.5 cm)	45	7

401-4.2 Asphalt Plant. Plants used for the preparation of asphalt shall conform to the requirements of American Association of State Highway and Transportation Officials (AASHTO) M156 including the following items.

a. **Inspection Of Plant.** The RPR, or RPR's authorized representative, shall have access, at all times, to all areas of the plant for checking adequacy of equipment; inspecting operation of the plant: verifying weights, proportions, and material properties; and checking the temperatures maintained in the preparation of the mixtures.

b. **Storage Bins And Surge Bins.** The asphalt mixture stored in storage and/or surge bins shall meet the same requirements as asphalt mixture loaded directly into trucks. Asphalt mixture shall not be stored in storage and/or surge bins for a period greater than twelve (12) hours. If the RPR determines there is an excessive heat loss, segregation, or oxidation of the asphalt mixture due to temporary storage, temporary storage shall not be allowed.

401-4.3 Aggregate Stockpile Management. Aggregate stockpiles shall be constructed in a manner that prevents segregation and intermixing of deleterious materials. Aggregates from different sources shall be stockpiled, weighed and batched separately at the asphalt batch plant. Aggregates that have become segregated or mixed with earth or foreign material shall not be used.

A continuous supply of materials shall be provided to the work to ensure continuous placement.

401-4.4 Hauling Equipment. Trucks used for hauling asphalt shall have tight, clean, and smooth metal beds. To prevent the asphalt from sticking to the truck beds, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other material approved by the RPR. Petroleum products shall not be used for coating truck beds. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary, to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers shall be securely fastened.

401-4.4.1 Material Transfer Vehicle (MTV). Material transfer vehicles used to transfer the material from the hauling equipment to the paver, shall use a self-propelled, material transfer vehicle with a swing conveyor that can deliver material to the paver without making contact with the paver. The MTV shall be able to move back and forth between the hauling equipment and the paver providing material transfer to the paver, while allowing the paver to operate at a constant speed. The Material Transfer Vehicle will have remixing and storage capability to prevent physical and thermal segregation.

401-4.5 Asphalt Pavers. Asphalt pavers shall be self-propelled with an activated heated screed, capable of spreading and finishing courses of asphalt that will meet the specified thickness, smoothness, and grade. The paver shall have sufficient power to propel itself and the hauling equipment without adversely affecting the finished surface. The asphalt paver shall be equipped with a control system capable of automatically maintaining the specified screed grade and elevation.

If the spreading and finishing equipment in use leaves tracks or indented areas, or produces other blemishes in the pavement that are not satisfactorily corrected by the scheduled operations, the use of such equipment shall be discontinued.

The paver shall be capable of paving to a minimum width specified in paragraph 401-4.12.

401-4.6 Rollers. The number, type, and weight of rollers shall be sufficient to compact the asphalt to the required density while it is still in a workable condition without crushing of the aggregate, depressions or other damage to the pavement surface. Rollers shall be in good condition, clean, and capable of operating at slow speeds to avoid displacement of the asphalt. All rollers shall be specifically designed and suitable for compacting asphalt concrete and shall be properly used. Rollers that impair the stability of any layer of a pavement structure or underlying soils shall not be used.

401-4.7 Density Device. The Contractor shall have on site a density gauge during all paving operations in order to assist in the determination of the optimum rolling pattern, type of roller and frequencies, as well as to monitor the effect of the rolling operations during production paving. The Contractor shall supply a qualified technician during all paving operations to calibrate the gauge and obtain accurate density readings for all new asphalt. These densities shall be supplied to the RPR upon request at any time during construction. No separate payment will be made for supplying the density gauge and technician.

401-4.8 Preparation of Asphalt Binder. The asphalt binder shall be heated in a manner that will avoid local overheating and provide a continuous supply of the asphalt binder to the mixer at a uniform temperature. The temperature of unmodified asphalt binder delivered to the mixer shall be sufficient to provide a suitable viscosity for adequate coating of the aggregate particles, but shall not exceed 325°F (160°C) when added to the aggregate. The temperature of modified asphalt binder shall be no more than 350°F (175°C) when added to the aggregate.

401-4.9 Preparation of Mineral Aggregate. The aggregate for the asphalt shall be heated and dried. The maximum temperature and rate of heating shall be such that no damage occurs to the aggregates. The temperature of the aggregate and mineral filler shall not exceed 350°F (175°C) when the asphalt binder is added. Particular care shall be taken that aggregates high in calcium or magnesium content are not damaged by overheating. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

401-4.10 Preparation of Asphalt Mixture. The aggregates and the asphalt binder shall be weighed or metered and mixed in the amount specified by the JMF. The combined materials shall be mixed until the aggregate obtains a uniform coating of asphalt binder and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but not less than 25 seconds for batch plants. The wet mixing time for all plants shall be established by the Contractor, based on the procedure for determining the percentage of coated particles described in ASTM D2489, for each individual plant and for each type of aggregate used. The wet mixing time will be set to achieve 95% of coated particles. For continuous mix plants, the minimum mixing time shall be determined by dividing the weight of its contents at operating level by the weight of the mixture delivered per second by the mixer. The moisture content of all asphalt upon discharge shall not exceed 0.5%.

401-4.11 Application of Prime and Tack Coat. Immediately before placing the asphalt mixture, the underlying course shall be cleaned of all dust and debris.

A prime coat in accordance with Item P-602 shall be applied to aggregate base prior to placing the asphalt mixture.

A tack coat shall be applied in accordance with Item P-603 to all vertical and horizontal asphalt and concrete surfaces prior to placement of the first and each subsequent lift of asphalt mixture.

401-4.12 Laydown Plan, Transporting, Placing, and Finishing. Prior to the placement of the asphalt, the Contractor shall prepare a laydown plan with the sequence of paving lanes and width to minimize the number of cold joints; the location of any temporary ramps; laydown temperature; and estimated time of completion for each portion of the work (milling, paving, rolling, cooling, etc.). The laydown plan and any modifications shall be approved by the RPR.

Deliveries shall be scheduled so that placing and compacting of asphalt is uniform with minimum stopping and starting of the paver. Hauling over freshly placed material shall not be permitted until the material has been compacted, as specified, and allowed to cool to approximately ambient temperature. The Contractor, at their expense, shall be responsible for repair of any damage to the pavement caused by hauling operations.

Contractor shall survey each lift of asphalt surface course and certify to RPR that every lot of each lift meets the grade tolerances of paragraph 401-6.2d before the next lift can be placed.

Edges of existing asphalt pavement abutting the new work shall be saw cut and the cut off material and laitance removed. Apply a tack coat in accordance with P-603 before new asphalt material is placed against it.

The speed of the paver shall be regulated to eliminate pulling and tearing of the asphalt mat. Placement of the asphalt mix shall begin along the centerline of a crowned section or on the high side of areas with a one way slope unless shown otherwise on the laydown plan as accepted by the RPR. The asphalt mix shall be placed in consecutive adjacent lanes having a minimum width of 8 feet (2.44 m) except where edge lanes require less width to complete the area. Additional screed sections attached to widen the paver to meet the minimum lane width requirements must include additional auger sections to move the asphalt mixture uniformly along the screed extension.

The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least one foot (30 cm); however, the joint in the surface top course shall be at the centerline of crowned pavements. Transverse joints in one course shall be offset by at least 10 feet (3 m) from transverse joints in the previous course. Transverse joints in adjacent lanes shall be offset a minimum of 10 feet (3 m).On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the asphalt may be spread and luted by hand tools.

The RPR may at any time, reject any batch of asphalt, on the truck or placed in the mat, which is rendered unfit for use due to contamination, segregation, incomplete coating of aggregate, or overheated asphalt mixture. Such rejection may be based on only visual inspection or temperature measurements. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the RPR, and if it can be demonstrated in the laboratory, in the presence of the RPR, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

Areas of segregation in the surface course, as determined by the RPR, shall be removed and replaced at the Contractor’s expense. The area shall be removed by saw cutting and milling a minimum of the construction lift thickness as specified in paragraph 401-3.3, Table 2 for the

approved mix design. The area to be removed and replaced shall be a minimum width of the paver and a minimum of 10 feet (3 m) long.

401-4.13 Compaction of Asphalt Mixture. After placing, the asphalt mixture shall be thoroughly and uniformly compacted by self-propelled rollers. The surface shall be compacted as soon as possible when the asphalt has attained sufficient stability so that the rolling does not cause undue displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor. The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Any surface defects and/or displacement occurring as a result of the roller, or from any other cause, shall be corrected at the Contractor's expense.

Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until the surface is of uniform texture, true to grade and cross-section, and the required field density is obtained. To prevent adhesion of the asphalt to the roller, the wheels shall be equipped with a scraper and kept moistened with water as necessary.

In areas not accessible to the roller, the mixture shall be thoroughly compacted with approved power tampers.

Any asphalt that becomes loose and broken, mixed with dirt, contains check-cracking, or in any way defective shall be removed and replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching shall not be allowed.

401-4.14 Joints. The formation of all joints shall be made to ensure a continuous bond between the courses and obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade.

The roller shall not pass over the unprotected end of the freshly laid asphalt except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing the adjacent lane. In both methods, all contact surfaces shall be coated with an asphalt tack coat before placing any fresh asphalt against the joint.

Longitudinal joints which have been left exposed for more than four (4) hours; the surface temperature has cooled to less than 175°F (80°C**)**; or are irregular, damaged, uncompacted or otherwise defective shall be cut back with a cutting wheel or pavement saw a maximum of 3 inches (75 mm) to expose a clean, sound, uniform vertical surface for the full depth of the course. All cutback material and any laitance produced from cutting joints shall be removed from the project. Asphalt tack coat in accordance with P-603 shall be applied to the clean, dry joint prior to placing any additional fresh asphalt against the joint. The cost of this work shall be considered incidental to the cost of the asphalt.

401-4.15 Saw-Cut Grooving. Saw-cut grooves shall be provided as specified in Item P-621. Saw-cut grooving is not required.

401-4.16 Diamond Grinding. Diamond grinding shall be completed prior to pavement grooving. Diamond grinding shall be accomplished by sawing with saw blades impregnated with industrial diamond abrasive.

Diamond grinding shall be performed with a machine designed specifically for diamond grinding capable of cutting a path at least 3 feet (0.9 m) wide. The saw blades shall be 1/8-inch (3-mm) wide with a sufficient number of blades to create grooves between 0.090 and 0.130 inches (2 and 3.5 mm) wide; and peaks and ridges approximately 1/32 inch (1 mm) higher than the bottom of the grinding cut. The actual number of blades will be determined by the Contractor and depend on the hardness of the aggregate. Equipment or grinding procedures that cause ravels, aggregate fractures, spalls or disturbance to the pavement will not be permitted. Contractor shall demonstrate to the RPR that the grinding equipment will produce satisfactory results prior to making corrections to surfaces.Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. The slurry resulting from the grinding operation shall be continuously removed and the pavement left in a clean condition. The Contractor shall apply a surface treatment per P-608 to all areas that have been subject to grinding.

401-4.17 Nighttime Paving Requirements. The Contractor shall provide adequate lighting during any nighttime construction. A lighting plan shall be submitted by the Contractor and approved by the RPR prior to the start of any nighttime work. All work shall be in accordance with the approved CSPP and lighting plan.

CONTRACTOR QUALITY CONTROL (CQC)

401-5.1 General. The contractor shall assure quality control throughout the program.

401-5.2 Contractor Quality Control (QC) Facilities. The Contractor shall provide or contract for testing facilities. The RPR shall be permitted unrestricted access to inspect the Contractor's QC facilities and witness QC activities. The RPR will advise the Contractor in writing of any noted deficiencies concerning the QC facility, equipment, supplies, or testing personnel and procedures. When the deficiencies are serious enough to be adversely affecting the test results, the incorporation of the materials into the work shall be suspended immediately and will not be permitted to resume until the deficiencies are satisfactorily corrected.

401-5.3 Contractor QC Testing. The Contractor shall perform all QC tests necessary to control the production and construction processes applicable to these specifications

a. **Asphalt Content.** A minimum of two tests shall be performed per day in accordance with ASTM D6307 or ASTM D2172 for determination of asphalt content. When using ASTM D6307, the correction factor shall be determined as part of the first test performed at the beginning of plant production; and as part of every tenth test performed thereafter. The asphalt content for the day will be determined by averaging the test results.

b. **Gradation.** Aggregate gradations shall be determined a minimum of twice per day from mechanical analysis of extracted aggregate in accordance with ASTM D5444, ASTM C136, and ASTM C117.

c. **Moisture Content of Aggregate.** The moisture content of aggregate used for production shall be determined a minimum of once per day in accordance with ASTM C566.

d. **Moisture Content of Asphalt.** The moisture content shall be determined once per day in accordance with AASHTO T329 or ASTM D1461.

e. **Temperatures.** Temperatures shall be checked, at least four times per day, at necessary locations to determine the temperatures of the dryer, the asphalt binder in the storage tank, the asphalt at the plant, and the asphalt at the job site.

f. In-Place Density Monitoring. The Contractor shall conduct any necessary testing to ensure that the specified density is being achieved. A nuclear gauge may be used to monitor the pavement density in accordance with ASTM D2950.

g. Smoothness for Contractor Quality Control. The Contractor shall perform smoothness testing in transverse and longitudinal directions daily to verify that the construction processes are producing pavement with variances less than ¼ inch in 12 feet, identifying areas that may pond water which could lead to hydroplaning of aircraft. If the smoothness criteria is not met, appropriate changes and corrections to the construction process shall be made by the Contractor before construction continues

The Contractor may use a 12-foot (3.7 m) "straightedge, a rolling inclinometer meeting the requirements of ASTM E2133 or rolling external reference device that can simulate a 12-foot (3.7m) straightedge approved by the RPR. Straight-edge testing shall start with one-half the length of the straightedge at the edge of pavement section being tested and then moved ahead one-half the length of the straightedge for each successive measurement. Testing shall be continuous across all joints. The surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between the two high points. If the rolling inclinometer or external reference device is used, the data may be evaluated using the FAA profile program, ProFAA, using the 12-foot straightedge simulation function.

Smoothness readings shall not be made across grade changes or cross slope transitions. The transition between new and existing pavement shall be evaluated separately for conformance with the plans.

(1) Transverse Measurements. Transverse measurements shall be taken for each day's production placed. Transverse measurements shall be taken perpendicular to the pavement centerline each 50 feet (15 m) or more often as determined by the RPR. The joint between lanes shall be tested separately to facilitate smoothness between lanes.

(2) Longitudinal Measurements. Longitudinal measurements shall be taken for each day's production placed. Longitudinal tests shall be parallel to the centerline of paving; at the center of paving lanes when widths of paving lanes are less than 20 feet (6 m); and at the third points of paving lanes when widths of paving lanes are 20 ft (6 m) or greater.

Deviations on the final surface course in either the transverse or longitudinal direction that will trap water greater than 1/4 inch (6 mm) shall be corrected with diamond grinding per paragraph 401-4.16 or by removing and replacing the surface course to full depth. Grinding shall be tapered in all directions to provide smooth transitions to areas not requiring grinding. All areas in which diamond grinding has been performed shall be subject to the final pavement thickness tolerances specified in paragraph 401-6.1d(3). Areas that have been ground shall be sealed with a surface treatment in accordance with Item P-608. To avoid the surface treatment creating any conflict with runway or taxiway markings, it may be necessary to seal a larger area.

Control charts shall be kept to show area of each day's placement and the percentage of corrective grinding required. Corrections to production and placement shall be initiated when corrective grinding is required. If the Contractor's machines and/or

methods produce significant areas that need corrective actions in excess of 10 percent of a day's production, production shall be stopped until corrective measures are implemented by the Contractor.

h. Grade. Grade shall be evaluated daily to allow adjustments to paving operations when grade measurements do not meet specifications. As a minimum, grade shall be evaluated prior to and after the placement of the first lift and after placement of the surface lift.

Measurements will be taken at appropriate gradelines (as a minimum at center and edges of paving lane) and longitudinal spacing as shown on cross-sections and plans. The final surface of the pavement will not vary from the gradeline elevations and cross-sections shown on the plans by more than 1/2 inch (12 mm) vertically. The documentation will be provided by the Contractor to the RPR.

Areas with humps or depressions that exceed grade or smoothness criteria and that retain water on the surface must be ground off provided the course thickness after grinding is not more than 1/2 inch (12 mm) less than the thickness specified on the plans. Grinding shall be in accordance with paragraph 401-4.16.

The Contractor shall repair low areas or areas that cannot be corrected by grinding by removal of deficient areas to the depth of the final course plus ½ inch and replacing with new material. Skin patching is not allowed.

401-5.4 Sampling. When directed by the RPR, the Contractor shall sample and test any material that appears inconsistent with similar material being sampled, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified.

401-5.5 Control Charts. The Contractor shall maintain linear control charts for both individual measurements and range (i.e. difference between highest and lowest measurements) for aggregate gradation, asphalt content, and VMA. The VMA for each day will be calculated and monitored by the QC laboratory.

Control charts shall be posted in a location satisfactory to the RPR and kept current. As a minimum, the control charts shall identify the project number, the contract item number, the test number, each test parameter, the Action and Suspension Limits applicable to each test parameter, and the Contractor's test results. The Contractor shall use the control charts as part of a process control system for identifying potential problems and assignable causes before they occur. If the Contractor's projected data during production indicates a problem and the Contractor is not taking satisfactory corrective action, the RPR may suspend production or acceptance of the material.

a. Individual Measurements. Control charts for individual measurements shall be established to maintain process control within tolerance for aggregate gradation, asphalt content, and VMA. The control charts shall use the job mix formula target values as indicators of central tendency for the following test parameters with associated Action and Suspension Limits:

Control Chart Limits for Individual Measurements

Sieve	Action Limit	Suspension Limit
3/4 inch (19.0 mm)	±6%	±9%
1/2 inch (12.5 mm)	±6%	±9%

Sieve	Action Limit	Suspension Limit
3/8 inch (9.5 mm)	±6%	±9%
No. 4 (4.75 mm)	±6%	±9%
No. 16 (1.18 mm)	±5%	±7.5%
No. 50 (300 µm)	±3%	±4.5%
No. 200 (75 µm)	±2%	±3%
Asphalt Content	±0.45%	±0.70%
Minimum VMA	-0.5%	-1.0%

b. Range. Control charts shall be established to control gradation process variability. The range shall be plotted as the difference between the two test results for each control parameter. The Suspension Limits specified below are based on a sample size of n = 2. Should the Contractor elect to perform more than two tests per lot, the Suspension Limits shall be adjusted by multiplying the Suspension Limit by 1.18 for n = 3 and by 1.27 for n = 4.

Control Chart Limits Based on Range

Sieve	Suspension Limit
1/2 inch (12.5 mm)	11%
3/8 inch (9.5 mm)	11%
No. 4 (4.75 mm)	11%
No. 16 (1.18 mm)	9%
No. 50 (300 µm)	6%
No. 200 (75 µm)	3.5%
Asphalt Content	0.8%

c. Corrective Action. As a minimum, a process shall be deemed out of control and production stopped and corrective action taken, if:

(1) One point falls outside the Suspension Limit line for individual measurements or range; or

(2) Two points in a row fall outside the Action Limit line for individual measurements.

401-5.6 QC Reports. The Contractor shall maintain records and shall submit reports of QC activities daily.

MATERIAL ACCEPTANCE

401-6.1 Acceptance Sampling and Testing. Unless otherwise specified, all acceptance sampling and testing necessary to determine conformance with the requirements specified in this section will be performed by the RPR at no cost to the Contractor except that coring as required in this section shall be completed and paid for by the Contractor.

a. Quality Assurance (QA) Testing Laboratory. The QA testing laboratory performing these acceptance tests will be accredited in accordance with ASTM D3666. The QA laboratory accreditation will be current and listed on the accrediting authority's website. All test methods required for acceptance sampling and testing will be listed on the lab accreditation.

b. Lot Size. A standard lot will be equal to one day's production divided into approximately equal sublots of between 400 to 600 tons. When only one or two sublots are produced in

a day's production, the sublots will be combined with the production lot from the previous or next day.

Where more than one plant is simultaneously producing asphalt for the job, the lot sizes will apply separately for each plant.

c. Asphalt Air Voids. Plant-produced asphalt will be tested for air voids on a sublot basis.

(1) Sampling. Material from each sublot shall be sampled in accordance with ASTM D3665. Samples shall be taken from material deposited into trucks at the plant or at the job site in accordance with ASTM D979. The sample of asphalt may be put in a covered metal tin and placed in an oven for not less than 30 minutes nor more than 60 minutes to maintain the material at or above the compaction temperature as specified in the JMF.

(2) Testing. Air voids will be determined for each sublot in accordance with ASTM D3203 for a set of compacted specimens prepared in accordance with ASTM D6925.

d. In-Place Asphalt Mat and Joint Density. Each sublot will be tested for in-place mat and joint density as a percentage of the theoretical maximum density (TMD).

(1) Sampling. The RPR will cut minimum 5 inch (125 mm) diameter samples in accordance with ASTM D5361. The Contractor shall furnish all tools, labor, and materials for cleaning, and filling the cored pavement. Laitance produced by the coring operation shall be removed immediately after coring, and core holes shall be filled within one day after sampling in a manner acceptable to the RPR.

(2) Bond. Each lift of asphalt shall be bonded to the underlying layer. If cores reveal that the surface is not bonded, additional cores shall be taken as directed by the RPR to determine the extent of unbonded areas. Unbonded areas shall be removed by milling and replaced at no additional cost as directed by the RPR.

(3) Thickness. Thickness of each lift of surface course will be evaluated by the RPR for compliance to the requirements shown on the plans after any necessary corrections for grade. Measurements of thickness will be made using the cores extracted for each sublot for density measurement. The maximum allowable deficiency at any point will not be more than 1/4 inch (6 mm) less than the thickness indicated for the lift. Average thickness of lift, or combined lifts, will not be less than the indicated thickness. Where the thickness tolerances are not met, the lot or sublot shall be corrected by the Contractor at his expense by removing the deficient area and replacing with new pavement. The Contractor, at his expense, may take additional cores as approved by the RPR to circumscribe the deficient area.

(4) Mat Density. One core shall be taken from each sublot. Core locations will be determined by the RPR in accordance with ASTM D3665. Cores for mat density shall not be taken closer than one foot (30 cm) from a transverse or longitudinal joint. The bulk specific gravity of each cored sample will be determined in accordance with ASTM D2726. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each sublot sample by the TMD for that sublot.

(5) Joint Density. One core centered over the longitudinal joint shall be taken for each sublot that has a longitudinal joint. Core locations will be determined by the RPR in accordance with ASTM D3665. The bulk specific gravity of each core sample will be

determined in accordance with ASTM D2726. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each joint density sample by the average TMD for the lot. The TMD used to determine the joint density at joints formed between lots will be the lower of the average TMD values from the adjacent lots.

401-6.2 Acceptance Criteria.

a. General. Acceptance will be based on the implementation of the Contractor Quality Control Program (CQCP) and the following characteristics of the asphalt and completed pavements: air voids, mat density, joint density, grade.

b. Air Voids and Mat Density. Acceptance of each lot of plant produced material for mat density and air voids will be based on the percentage of material within specification limits (PWL). If the PWL of the lot equals or exceeds 90%, the lot will be acceptable. Acceptance and payment will be determined in accordance with paragraph 401-8.1.

c. Joint Density. Acceptance of each lot of plant produced asphalt for joint density will be based on the PWL. If the PWL of the lot is equal to or exceeds 90%, the lot will be considered acceptable. If the PWL is less than 90%, the Contractor shall evaluate the reason and act accordingly. If the PWL is less than 80%, the Contractor shall cease operations and until the reason for poor compaction has been determined. If the PWL is less than 71%, the pay factor for the lot used to complete the joint will be reduced by five (5) percentage points. This lot pay factor reduction will be incorporated and evaluated in accordance with paragraph 401-8.1.

d. Grade. The final finished surface of the pavement shall be surveyed to verify that the grade elevations and cross-sections shown on the plans do not deviate more than 1/2 inch (12 mm) vertically**.**

Cross-sections of the pavement shall be taken at a minimum **50-foot (15-m)** longitudinal spacing and at all longitudinal grade breaks. Minimum cross-section grade points shall include grade at centerline, **± 10 feet of centerline**, and edge of **runway** pavement.

The survey and documentation shall be stamped and signed by a licensed surveyor. Payment for sublots that do not meet grade for over 25% of the sublot shall not be more than 95%.

e. Profilograph Roughness For QA Acceptance. Not used.

401-6.3 Percentage of Material Within Specification Limits (PWL). The PWL will be determined in accordance with procedures specified in Item C-110. The specification tolerance limits (L) for lower and (U) for upper are contained in Table 5.

Table 5. Acceptance Limits for Air Voids and Density

Test Property	**Pavements Specification Tolerance Limits**	
	L	**U**
Air Voids Total Mix (%)	2.0	5.0
Surface Course Mat Density (%)	92.8	**-**
Base Course Mat Density (%)	92.0	**-**
Joint density (%)	90.5	--

a. Outliers. All individual tests for mat density and air voids will be checked for outliers (test criterion) in accordance with ASTM E178, at a significance level of 5%. Outliers will be discarded, and the PWL will be determined using the remaining test values. The criteria in Table 5 is based on production processes which have a variability with the following standard deviations: Surface Course Mat Density (%), 1.30; Base Course Mat Density (%), 1.55; Joint Density (%), 1.55.

The Contractor should note that (1) 90 PWL is achieved when consistently producing a surface course with an average mat density of at least 94.5% with 1.30% or less variability, (2) 90 PWL is achieved when consistently producing a base course with an average mat density of at least 94.0% with 1.55% or less variability, and (3) 90 PWL is achieved when consistently producing joints with an average joint density of at least 92.5% with 1.55% or less variability.

401-6.4 Resampling Pavement for Mat Density.

a. General. Resampling of a lot of pavement will only be allowed for mat density, and then, only if the Contractor requests same, in writing, within 48 hours after receiving the written test results from the RPR. A retest will consist of all the sampling and testing procedures contained in paragraphs 401-6.1d and 401-6.2b. Only one resampling per lot will be permitted.

(1) A redefined PWL will be calculated for the resampled lot. The number of tests used to calculate the redefined PWL will include the initial tests made for that lot plus the retests.

(2) The cost for resampling and retesting shall be borne by the Contractor.

b. Payment for Resampled Lots. The redefined PWL for a resampled lot will be used to calculate the payment for that lot in accordance with Table 6.

c. Outliers. Check for outliers in accordance with ASTM E178, at a significance level of 5%.

METHOD OF MEASUREMENT

401-7.1 Measurement. Asphalt shall be measured by the number of tons **(**kg**)** of asphalt used in the accepted work. Batch weights or truck scale weights will be used to determine the basis for the tonnage.

BASIS OF PAYMENT

401-8.1 Payment. Payment for a lot of asphalt meeting all acceptance criteria as specified in paragraph 401-6.2 shall be made based on results of tests for mat density and air voids. Payment for acceptable lots shall be adjusted according to paragraph 401-8.1c for mat density and air voids; and paragraph 401-6.2c for joint density, subject to the limitation that:

a. The total project payment for plant mix asphalt pavement shall not exceed 100 percent of the product of the contract unit price and the total number of tons (kg) of asphalt used in the accepted work.

b. The price shall be compensation for furnishing all materials, for all preparation, mixing, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

c. Basis Of Adjusted Payment. The pay factor for each individual lot shall be calculated in accordance with Table 6. A pay factor shall be calculated for both mat density and air voids. The lot pay factor shall be the higher of the two values when calculations for both mat density and air voids are 100% or higher. The lot pay factor shall be the product of the two values when only one of the calculations for either mat density or air voids is 100% or higher. The lot pay factor shall be the lower of the two values when calculations for both mat density and air voids are less than 100%. If PWL for joint density is less than 71% then the lot pay factor shall be reduced by 5% but be no higher than 95%.

For each lot accepted, the adjusted contract unit price shall be the product of the lot pay factor for the lot and the contract unit price. Payment shall be subject to the total project payment limitation specified in paragraph 401-8.1a. Payment in excess of 100% for accepted lots of asphalt shall be used to offset payment for accepted lots of asphalt pavement that achieve a lot pay factor less than 100%.

Payment for sublots which do not meet grade in accordance with paragraph 401-6.2d after correction for over 25% of the sublot shall be reduced by 5%.

Table 6. Price adjustment schedule[1]

Percentage of material within specification limits (PWL)	Lot pay factor (percent of contract unit price)
96 – 100	106
90 – 95	PWL + 10
75 – 89	0.5 PWL + 55
55 – 74	1.4 PWL – 12
Below 55	Reject [2]

[1] Although it is theoretically possible to achieve a pay factor of 106% for each lot, actual payment above 100% shall be subject to the total project payment limitation specified in paragraph 401-8.1a.

[2] The lot shall be removed and replaced. However, the RPR may decide to allow the rejected lot to remain. In that case, if the RPR and Contractor agree in writing that the lot shall not be removed, it shall be paid for at 50% of the contract unit price and the total project payment shall be reduced by the amount withheld for the rejected lot.

d. Profilograph Roughness. Not used.

401-8.1 Payment. Payment will be made under:

~~Item P-401-8.1 Asphalt Surface Course - per ton (kg)~~

Item P-401-1 2" Bituminous Surface Course, 76-22 Binder -per Ton (TN)

Item P-401-2 4" Bituminous Surface Course, 76-22 Binder -per Ton (TN)

REFERENCES

401-9.1 The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C29 Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate

ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C127	Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM C566	Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D242	Standard Specification for Mineral Filler for Bituminous Paving Mixtures
ASTM D946	Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction
ASTM D979	Standard Practice for Sampling Asphalt Paving Mixtures
ASTM D1073	Standard Specification for Fine Aggregate for Asphalt Paving Mixtures
ASTM D1188	Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples
ASTM D2172	Standard Test Method for Quantitative Extraction of Bitumen from Asphalt Paving Mixtures
ASTM D1461	Standard Test Method for Moisture or Volatile Distillates in Asphalt Paving Mixtures
ASTM D2041	Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D2489	Standard Practice for Estimating Degree of Particle Coating of Bituminous-Aggregate Mixtures
ASTM D2726	Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures

ASTM D2950 Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods

ASTM D3203 Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures

ASTM D3381 Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction

ASTM D3665 Standard Practice for Random Sampling of Construction Materials

ASTM D3666 Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D4552 Standard Practice for Classifying Hot-Mix Recycling Agents

ASTM D4791 Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate

ASTM D4867 Standard Test Method for Effect of Moisture on Asphalt Concrete Paving Mixtures

ASTM D5361 Standard Practice for Sampling Compacted Asphalt Mixtures for Laboratory Testing

ASTM D5444 Standard Test Method for Mechanical Size Analysis of Extracted Aggregate

ASTM D5821 Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate

ASTM D6084 Standard Test Method for Elastic Recovery of Bituminous Materials by Ductilometer

ASTM D6307 Standard Test Method for Asphalt Content of Hot Mix Asphalt by Ignition Method

ASTM D6373 Standard Specification for Performance Graded Asphalt Binder

ASTM D6752 Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Automatic Vacuum Sealing Method

ASTM D6925 Standard Test Method for Preparation and Determination of the Relative Density of Hot Mix Asphalt (HMA) Specimens by Means of the SuperPave Gyratory Compactor.

ASTM D6926 Standard Practice for Preparation of Bituminous Specimens Using Marshall Apparatus

ASTM D6927 Standard Test Method for Marshall Stability and Flow of Bituminous Mixtures

ASTM D6995 Standard Test Method for Determining Field VMA based on the Maximum Specific Gravity of the Mix (Gmm)

ASTM E11 Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves

ASTM E178 Standard Practice for Dealing with Outlying Observations

ASTM E1274 Standard Test Method for Measuring Pavement Roughness Using a Profilograph

ASTM E950 Standard Test Method for Measuring the Longitudinal Profile of Traveled Surfaces with an Accelerometer Established Inertial Profiling Reference

ASTM E2133 Standard Test Method for Using a Rolling Inclinometer to Measure Longitudinal and Transverse Profiles of a Traveled Surface

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M156 Standard Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.

AASHTO T329 Standard Method of Test for Moisture Content of Hot Mix Asphalt (HMA) by Oven Method

AASHTO T324 Standard Method of Test for Hamburg Wheel-Track Testing of Compacted Asphalt Mixtures

AASHTO T 340 Standard Method of Test for Determining the Rutting Susceptibility of Hot Mix Asphalt (APA) Using the Asphalt Pavement Analyzer (APA)

Asphalt Institute (AI)

Asphalt Institute Handbook MS-26, Asphalt Binder

Asphalt Institute MS-2 Mix Design Manual, 7th Edition

AI State Binder Specification Database

Federal Highway Administration (FHWA)

Long Term Pavement Performance Binder Program

Advisory Circulars (AC)

AC 150/5320-6 Airport Pavement Design and Evaluation

FAA Orders

5300.1 Modifications to Agency Airport Design, Construction, and Equipment Standards

Software

FAARFIELD

END OF ITEM P-401

ITEM P-602

EMULSIFIED ASPHALT PRIME COAT

ITEM P-602, "EMULSIFIED ASPHALT PRIME COAT" is a technical specification contained in Federal Aviation Administration Advisory Circular – 150/5370-10H, "Standard Specifications for Construction of Airports."

This item has been modified to make allowances for local materials, methods and requirements. This item has been updated and modified to comply with the latest editions of other applicable codes, from knowledge gained on other airport construction projects and valuable lessons learned from airport maintenance staffs.

Deletions are noted by the ~~strikethrough~~ method.

Changes and additions are noted by the ***bold italic*** method.

ITEM P-602

EMULSIFIED ASPHALT PRIME COAT

DESCRIPTION

602-1.1 This item shall consist of an application of emulsified asphalt material on the prepared base course in accordance with these specifications and in reasonably close conformity to the lines shown on the plans.

MATERIALS

602-2.1 Emulsified Asphalt material. The emulsified asphalt material shall be as specified in ASTM D3628 for use as a prime coat appropriate to local conditions. The Contractor shall provide a copy of the manufacturer's Certificate of Analysis (COA) for the emulsified asphalt material. The COA shall be provided to and approved by the Resident Project Representative (RPR) before the emulsified asphalt material is applied. The furnishing of the COA for the emulsified asphalt material shall not be interpreted as a basis for final acceptance. The manufacturer's COA may be subject to verification by testing the material delivered for use on the project.

CONSTRUCTION METHODS

602-3.1 Weather Limitations. The emulsified asphalt prime coat shall be applied only when the existing surface is dry; the atmospheric temperature is 50°F (10°C) or above, and the temperature has not been below 35°F (2°C) for the 12 hours prior to application; and when the weather is not foggy or rainy. The temperature requirements may be waived when directed by the RPR.

602-3.2 Equipment. The equipment shall include a self-powered pressure asphalt material distributor and equipment for heating asphalt material.

Provide a distributor with pneumatic tires of such size and number that the load produced on the base surface does not exceed 65.0 psi (4.5 kg/sq cm) of tire width to prevent rutting, shoving or otherwise damaging the base, surface or other layers in the pavement structure. Design and equip the distributor to spray the asphalt material in a uniform coverage at the specified temperature, at readily determined and controlled rates from 0.05 to 1.0 gallons per square yard (0.23 to 4.5 L/square meter), with a pressure range of 25 to 75 psi (172.4 to 517.1 kPa) and with an allowable variation from the specified rate of not more than ±5%, and at variable widths. Include with the distributor equipment a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gauges, volume-measuring devices, adequate heaters for heating of materials to the proper application temperature, a thermometer for reading the temperature of tank contents, and a hand hose attachment suitable for applying asphalt material manually to areas inaccessible to the distributor. Equip the distributor to circulate and agitate the asphalt material during the heating process. If the distributor is not equipped with an operable quick shutoff valve, the prime operations shall be started and stopped on building paper.

A power broom and power blower suitable for cleaning the surfaces to which the asphalt coat is to be applied shall be provided.

Asphalt distributors must be calibrated annually in accordance with ASTM D2995. The Contractor must furnish a current calibration certification for the asphalt distributor truck from any State or other agency as approved by the RPR.

602-3.3 Application of Emulsified Asphalt Material. Immediately before applying the prime coat, the full width of the surface to be primed shall be swept with a power broom to remove all loose dirt and other objectionable material.

The asphalt emulsion material shall be uniformly applied with an asphalt distributor at the rate of 0.15 to 0.30 gallons per square yard (0.68 to 1.36 liters per square meter) depending on the base course surface texture. The type of asphalt material and application rate shall be approved by the RPR prior to application.

Following application of the emulsified asphalt material and prior to application of the succeeding layer of pavement, allow the asphalt coat to cure and to obtain evaporation of any volatiles or moisture. Maintain the coated surface until the succeeding layer of pavement is placed, by protecting the surface against damage and by repairing and recoating deficient areas. Allow the prime coat to cure without being disturbed for a period of at least 48 hours or longer, as may be necessary to attain penetration into the treated course. Furnish and spread sand to effectively blot up and cure excess asphalt material. The Contractor shall remove blotting sand prior to asphalt concrete lay down operations at no additional expense to the Owner. Keep traffic off surfaces freshly treated with asphalt material. Provide sufficient warning signs and barricades so that traffic will not travel over freshly treated surfaces.

602-3.4 Trial Application Rates. The Contractor shall apply a minimum of three lengths of at least 100 feet (30 m) for the full width of the distributor bar to evaluate the amount of emulsified asphalt material that can be satisfactorily applied with the equipment. Apply three different application rates of emulsified asphalt materials within the application range specified in paragraph 602-3.3. Other trial applications can be made using various amounts of material as directed by the RPR. The trial application is to demonstrate the equipment can uniformly apply the emulsified asphalt material within the rates specified and determine the application rate for the project.

602-3.5 Freight and Waybills. The Contractor shall submit waybills and delivery tickets during the progress of the work. Before the final estimate is allowed, file with the RPR certified waybills and certified delivery tickets for all emulsified asphalt materials used in the construction of the pavement covered by the contract. Do not remove emulsified asphalt material from storage until the initial outage and temperature measurements have been taken. The delivery or storage units will not be released until the final outage has been taken.

METHOD OF MEASUREMENT

602-4.1 ~~The emulsified asphalt material for prime coat shall be measured by the gallon (liter) Volume shall be corrected to the volume at 60°F (16°C) in accordance with ASTM D4311. The emulsified asphalt material paid for will be the measured quantities used in the accepted work, provided that the measured quantities are not 10% over the specified application rate. Any amount of emulsified asphalt material more than 10% over the specified application rate for each application will be deducted from the measured quantities, except for irregular areas where hand spraying of the emulsified asphalt material is necessary. Water added to emulsified asphalt will not be measured for payment.~~

BASIS OF PAYMENT

602-5.1 ~~Payment shall be made at the contract unit price per gallon (liter) for emulsified asphalt prime coat. This price shall be full compensation for furnishing all materials and for all preparation, delivering, and applying the materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.~~

No separate payment shall be made for Bituminous Prime Coat. Payment for this item shall be incidental to respective bituminous surface course.

~~Payment will be made under:~~

~~Item P-602-5.1 Emulsified Asphalt Prime Coat - per gallon (liter)~~

REFERENCES

603.5-2 The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D2995 Standard Practice for Estimating Application Rate and Residual Application Rate of Bituminous Distributors

ASTM D3628 Standard Practice for Selection and Use of Emulsified Asphalts

END ITEM P-602

ITEM P-603

EMULSIFIED ASPHALT TACK COAT

ITEM P-603, "EMULSIFIED ASPHALT TACK COAT" is a technical specification contained in Federal Aviation Administration Advisory Circular – 150/5370-10H, "Standard Specifications for Construction of Airports."

This item has been modified to make allowances for local materials, methods and requirements. This item has been updated and modified to comply with the latest editions of other applicable codes, from knowledge gained on other airport construction projects and valuable lessons learned from airport maintenance staffs.

Deletions are noted by the ~~strikethrough~~ method.

Changes and additions are noted by the ***bold italic*** method.

ITEM P-603

EMULSIFIED ASPHALT TACK COAT

DESCRIPTION

603-1.1 This item shall consist of preparing and treating an asphalt or concrete surface with asphalt material in accordance with these specifications and in reasonably close conformity to the lines shown on the plans

MATERIALS

603-2.1 Asphalt materials. The asphalt material shall be an emulsified asphalt as specified in ASTM D3628 as an asphalt application for tack coat appropriate to local conditions. The emulsified asphalt shall not be diluted. The Contractor shall provide a copy of the manufacturer's Certificate of Analysis (COA) for the asphalt material to the Resident Project Representative (RPR) before the asphalt material is applied for review and acceptance. The furnishing of COA for the asphalt material shall not be interpreted as a basis for final acceptance. The manufacturer's COA may be subject to verification by testing the material delivered for use on the project.

CONSTRUCTION METHODS

603-3.1 Weather limitations. The tack coat shall be applied only when the existing surface is dry and the atmospheric temperature is 50°F (10°C) or above; the temperature has not been below 35°F (2°C) for the 12 hours prior to application; and when the weather is not foggy or rainy. The temperature requirements may be waived when directed by the RPR.

603-3.2 Equipment. The Contractor shall provide equipment for heating and applying the emulsified asphalt material. The emulsion shall be applied with a manufacturer-approved computer rate-controlled asphalt distributor. The equipment shall be in good working order and contain no contaminants or diluents in the tank. Spray bar tips must be clean, free of burrs, and of a size to maintain an even distribution of the emulsion. Any type of tip or pressure source is suitable that will maintain predetermined flow rates and constant pressure during the application process with application speeds under eight (8) miles per hour (13 km per hour) or seven (700) feet per minute (213 m per minute).

The equipment will be tested under pressure for leaks and to ensure proper set-up before use to verify truck set-up (via a test-shot area), including but not limited to, nozzle tip size appropriate for application, spray-bar height and pressure and pump speed, evidence of triple-overlap spray pattern, lack of leaks, and any other factors relevant to ensure the truck is in good working order before use.

The distributor truck shall be equipped with a minimum 12-foot (3.7-m) spreader spray bar with individual nozzle control with computer-controlled application rates. The distributor truck shall have an easily accessible thermometer that constantly monitors the temperature of the emulsion, and have an operable mechanical tank gauge that can be used to cross-check the computer accuracy. If the distributor is not equipped with an operable quick shutoff valve, the prime operations shall be started and stopped on building paper.

The distributor truck shall be equipped to effectively heat and mix the material to the required temperature prior to application as required. Heating and mixing shall be done in accordance with the manufacturer's recommendations. Do not overheat or over mix the material.

The distributor shall be equipped with a hand sprayer.

Asphalt distributors must be calibrated annually in accordance with ASTM D2995. The Contractor must furnish a current calibration certification for the asphalt distributor truck from any State or other agency as approved by the RPR.

A power broom and/or power blower suitable for cleaning the surfaces to which the asphalt tack coat is to be applied shall be provided.

603-3.3 Application of emulsified asphalt material. The emulsified asphalt shall not be diluted. Immediately before applying the emulsified asphalt tack coat, the full width of surface to be treated shall be swept with a power broom and/or power blower to remove all loose dirt and other objectionable material.

The emulsified asphalt material shall be uniformly applied with an asphalt distributor at the rates appropriate for the conditions and surface specified in the table below. The type of asphalt material and application rate shall be approved by the RPR prior to application.

Emulsified Asphalt

Surface Type	Residual Rate, gal/SY (L/square meter)	Emulsion Application Bar Rate, gal/SY (L/square meter)
New asphalt	0.02-0.05 (0.09-0.23)	0.03-0.07 (0.13-0.32)
Existing asphalt	0.04-0.07 (0.18-0.32)	0.06-0.11 (0.27-0.50)
Milled Surface	0.04-0.08 (0.18-0.36)	.0.06-0.12 (0.27-0.54)
Concrete	0.03-0.05 (0.13-0.23)	0.05-0.08 (0.23-0.36)

After application of the tack coat, the surface shall be allowed to cure without being disturbed for the period of time necessary to permit drying and setting of the tack coat. This period shall be determined by the RPR. The Contractor shall protect the tack coat and maintain the surface until the next course has been placed. When the tack coat has been disturbed by the Contractor, tack coat shall be reapplied at the Contractor's expense.

603-3.4 Freight and waybills The Contractor shall submit waybills and delivery tickets, during progress of the work. Before the final statement is allowed, file with the RPR certified waybills and certified delivery tickets for all emulsified asphalt materials used in the construction of the pavement covered by the contract. Do not remove emulsified asphalt material from storage until the initial outage and temperature measurements have been taken. The delivery or storage units will not be released until the final outage has been taken.

METHOD OF MEASUREMENT

~~**603-4.1** The emulsified asphalt material for tack coat shall be measured by the gallon (liter). Volume shall be corrected to the volume at 60°F (16°C) in accordance with ASTM D1250. The emulsified asphalt material paid for will be the measured quantities used in the accepted work, provided that the measured quantities are not 10% over the specified application rate. Any amount of emulsified asphalt material more than 10% over the specified application rate for each application will be deducted from the measured quantities, except for irregular areas where hand spraying of the emulsified asphalt material is necessary. Water added to emulsified asphalt will not be measured for payment.~~

BASIS OF PAYMENT

~~**603.5-1** Payment shall be made at the contract unit price per gallon (liter) of emulsified asphalt material. This price shall be full compensation for furnishing all materials, for all preparation, delivery, and application of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.~~

No separate payment shall be made for Bituminous Prime Coat. Payment for this item shall be incidental to respective bituminous surface course.

~~Payment will be made under:~~

~~Item P-603-5.1 Emulsified Asphalt Tack Coat - per gallon (liter)~~

REFERENCES

603.5-2 The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D1250	Standard Guide for Use of the Petroleum Measurement Tables
ASTM D2995	Standard Practice for Estimating Application Rate and Residual Application Rate of Bituminous Distributors
ASTM D3628	Standard Practice for Selection and Use of Emulsified Asphalts

END ITEM P-603

ITEM P-620

RUNWAY AND TAXIWAY MARKING

ITEM P-620, "RUNWAY AND TAXIWAY MARKING" is a technical specification contained in Federal Aviation Administration Advisory Circular – 150/5370-10H, "Standards Specifications for Construction Of Airports."

This item has been modified to make allowances for local materials, methods and requirements. This item has been updated and modified to comply with the latest editions of other applicable codes, from knowledge gained on other airport construction projects and valuable lessons learned from airport maintenance staffs.

Deletions are noted by the ~~strikethrough~~ method.

Changes and additions are noted by the ***bold italic*** method.

ITEM P-620

RUNWAY AND TAXIWAY MARKING

DESCRIPTION

620-1.1 This item shall consist of the preparation and painting of numbers, markings, and stripes on the surface of runways, taxiways, and aprons, in accordance with these specifications and at the locations shown on the plans, or as directed by the Engineer. The terms “paint” and “marking material” as well as “painting” and “application of markings” are interchangeable throughout this specification.

MATERIALS

620-2.1 Materials Acceptance. The Contractor shall furnish manufacturer’s certified test reports, for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. This certification along with a copy of the paint manufacturer’s surface preparation; marking materials, including adhesion, flow promoting and/or floatation additive; and application requirements must be submitted and approved by the Resident Project Representative (RPR) prior to the initial application of markings. The reports can be used for material acceptance or the RPR may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the RPR upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers that are easily quantifiable for inspection by the RPR.

620-2.2 Marking Materials.

Table 1. Marking Materials

Paint[1]				Glass Beads[2]	
Type	**Color**	**Fed Std. 595 Number**	**Application Rte Maximum**	**Type**	**Application Rate Minimum**
Waterborne Type II	White	37925	115 ft^2/gal (2.8 m^2/l)	III	10 lb/gal (1.2 kg/l)
Waterborne Type II	Yellow	33538	115 ft^2/gal (2.8 m^2/l)	III	10 lb/gal (1.2 kg/l)
Waterborne Type II	Black	37038	115 ft^2/gal (2.8 m^2/l)	No beads	No beads
Temporary Waterborne Type II	White	37925	230 ft^2/gal (5.6 m^2/l)	No beads	No beads
Temporary Waterborne Type II	Yellow	33538	230 ft^2/gal (5.6 m^2/l)	No beads	No beads
Temporary Waterborne Type II	Black	37038	230 ft^2/gal (5.6 m^2/l)	No beads	No beads

[1] See Paragraph 620-2.2a
[2] See Paragraph 620-2.2b

a. Paint Paint shall be waterborne in accordance with the requirements of this paragraph. Paint colors shall comply with Federal Standard No. 595.

1. **Waterborne**. Paint shall meet the requirements of Federal Specification TT-P-1952F, Type II The non-volatile portion of the vehicle for all paint types shall be composed of a 100% acrylic polymer as determined by infrared spectral analysis.

b. Reflective Media. Glass beads for white and yellow paint shall meet the requirements for Federal Specification TT-B-1325D Type III.

Glass beads for red and pink paint shall meet the requirements for Type IV, Gradation A.

Glass beads shall be treated with all compatible coupling agents recommended by the manufacturers of the paint and reflective media to ensure adhesion and embedment.

Glass beads shall not be used in black and green paint.

Type III glass beads shall not be used in red and pink paint.

CONSTRUCTION METHODS

620-3.1 Weather Limitations. Painting shall only be performed when the surface is dry, and the ambient temperature and the pavement surface temperature meet the manufacturer's recommendations in accordance with paragraph 620-2.1. Painting operations shall be discontinued when the ambient or surface temperatures does not meet the manufacturer's recommendations. Markings shall not be applied when the wind speed exceeds 10 mph unless windscreens are used to shroud the material guns. Markings shall not be applied when weather conditions are forecasts to not be within the manufacturers' recommendations for application and dry time.

620-3.2 Equipment. Equipment shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, a bead dispensing machine, and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the job. The mechanical marker shall be an atomizing spray-type or airless type marking machine with automatic glass bead dispensers suitable for application of traffic paint. It shall produce an even and uniform film thickness and appearance of both paint and glass beads at the required coverage and shall apply markings of uniform cross-sections and clear-cut edges without running or spattering and without over spray. The marking equipment for both paint and beads shall be calibrated daily.

620-3.3 Preparation of Surfaces. Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other contaminates that would reduce the bond between the paint and the pavement. Use of any chemicals or impact abrasives during surface preparation shall be approved in advance by the RPR. After the cleaning operations, sweeping, blowing, or rinsing with pressurized water shall be performed to ensure the surface is clean and free of grit or other debris left from the cleaning process.

a. Preparation of New Pavement Surfaces. The area to be painted shall be cleaned by broom, blower, water blasting, or by other methods approved by the RPR to remove all contaminants, including PCC curing compounds, minimizing damage to the pavement surface.

b. Preparation of Pavement to Remove Existing Markings. Existing pavement markings shall be removed by rotary grinding, water blasting, or by other methods approved by the RPR minimizing damage to the pavement surface. The removal area may need to be larger than the area of the markings to eliminate ghost markings. After removal of markings

on asphalt pavements, apply a fog seal or seal coat to 'block out' the removal area to eliminate 'ghost' markings.

c. **Preparation of Pavement Markings Prior to Remarking.** Prior to remarking existing markings, loose existing markings must be removed minimizing damage to the pavement surface, with a method approved by the RPR. After removal, the surface shall be cleaned of all residue or debris.

Prior to the application of markings, the Contractor shall certify in writing that the surface is dry and free from dirt, grease, oil, laitance, or other foreign material that would prevent the bond of the paint to the pavement or existing markings. This certification along with a copy of the paint manufactures application and surface preparation requirements must be submitted to the RPR prior to the initial application of markings.

620-3.4 Layout of Markings. The proposed markings shall be laid out in advance of the paint application. The locations of markings to receive glass beads shall be shown on the plans.

620-3.5 Application. A period of 30 days shall elapse between placement of surface course or seal coat and application of the permanent paint markings. Paint shall be applied at the locations and to the dimensions and spacing shown on the plans. Paint shall not be applied until the layout and condition of the surface has been approved by the RPR.

The edges of the markings shall not vary from a straight line more than 1/2 inch (12 mm) in 50 feet (15 m), and marking dimensions and spacing shall be within the following tolerances:

Marking Dimensions and Spacing Tolerance

Dimension and Spacing	Tolerance
36 inch (910 mm) or less	±1/2 inch (12mm)
greater than 36 inch to 6 feet (910 mm to 1.85m)	±1 inch (25mm)
Greater than 6 feet to 60 feet (1.85m to 18.3m)	±2 inch (50mm)
Greater than 60 feet (18.3m)	±3 inch (76 mm)

The paint shall be mixed in accordance with the manufacturer's instructions and applied to the pavement with a marking machine at the rate shown in Table 1. The addition of thinner will not be permitted.

Glass beads shall be distributed upon the marked areas at the locations shown on the plans to receive glass beads immediately after application of the paint. A dispenser shall be furnished that is properly designed for attachment to the marking machine and suitable for dispensing glass beads. Glass beads shall be applied at the rate shown in Table 1. Glass beads shall not be applied to black paint or green paint. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made. Different bead types shall not be mixed. Regular monitoring of glass bead embedment and distribution should be performed.

620-3.6 Application--Preformed Thermoplastic Airport Pavement Markings. Preformed thermoplastic pavement markings not used.

620-3.7 Control Strip. Prior to the full application of airfield markings, the Contractor shall prepare a control strip in the presence of the RPR. The Contractor shall demonstrate the surface preparation method and all striping equipment to be used on the project. The marking equipment must achieve the prescribed application rate of paint and population of glass beads (per Table 1) that are properly embedded and evenly distributed across the full width of the marking. Prior to

acceptance of the control strip, markings must be evaluated during darkness to ensure a uniform appearance.

620-3.8 Retro-Reflectance. Reflectance shall be measured with a portable retro-reflectometer meeting ASTM E1710 (or equivalent). A total of 6 reading shall be taken over a 6 square foot area with 3 readings taken from each direction. The average shall be equal to or above the minimum levels of all readings which are within 30% of each other.

Minimum Retro-Reflectance Values

Material	Retro-reflectance mcd/m^2/lux		
	White	Yellow	Red
Initial Type I	300	175	35
Initial Type III	600	300	35
Initial Thermoplastic	225	100	35
All materials, remark when less than[1]	100	75	10

1. Prior to remarking determine if removal of contaminants on markings will restore retro-reflectance

620-3.9 Protection And Cleanup. After application of the markings, all markings shall be protected from damage until dry. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings. The Contractor shall remove from the work area all debris, waste, loose reflective media, and by-products generated by the surface preparation and application operations to the satisfaction of the RPR. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and federal environmental statutes and regulations.

METHOD OF MEASUREMENT

620-4.1a The quantity of surface preparation shall be measured by the number of square feet (square meters) for each type of surface preparation specified in paragraph 620-3.3

620-4.1b The quantity of markings shall be paid for shall be measured by the number of square feet (square meters) of painting

620-4.1c The quantity of reflective media shall be paid for by the number of pounds (km) of reflective media.

620-4.1d The quantity of temporary markings to be paid for shall be the number of square feet (square meters) of painting

BASIS OF PAYMENT

620-5.1 This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item complete in place and accepted by the RPR in accordance with these specifications.

620-5.1a Payment for surface preparation shall be made at the contract price for the number of square feet (square meters) for each type of surface preparation specified in paragraph 620-3.3.

620-5.2b Payment for markings shall be made at the contract price for the number of square feet (square meters) of painting

620-5.3c Payment for reflective media shall be made at the contract unit price for the number of pounds (km) of reflective media.

620-5.4d Payment for temporary markings shall be made at the contract price for the number of square feet (square meters) of painting. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

~~Item P-620-5.1a Surface Preparation per square foot (square meter)~~

~~Item P-620-5.2b Marking per square foot (square meter)~~

~~Item P-620-5.3c Reflective Media per pound (km)~~

~~Item P-620-5.4d Temporary runway and taxiway marking per square foot (square meter)~~

Item P-620-1 Apron Pavement Markings -per Lump Sum (LS)

Item P-620-2 Taxiway Connector Pavement Markings -per Lump Sum (LS)

REFERENCES

620-6.1 The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D476 Standard Classification for Dry Pigmentary Titanium Dioxide Products

ASTM D968 Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive

ASTM D1652 Standard Test Method for Epoxy Content of Epoxy Resins

ASTM D2074 Standard Test Method for Total, Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method

ASTM D2240 Standard Test Method for Rubber Property - Durometer Hardness

ASTM D7585 Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments

ASTM E303 Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester

ASTM E1710 Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer

ASTM E2302 Standard Test Method for Measurement of the Luminance Coefficient Under Diffuse Illumination of Pavement Marking Materials Using a Portable Reflectometer

ASTM G154 Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

Code of Federal Regulations (CFR)

40 CFR Part 60, Appendix A-7, Method 24 Determination of volatile matter content, water content, density, volume solids, and weight solids of surface coatings

29 CFR Part 1910.1200 Hazard Communication

Federal Specifications (FED SPEC)

FED SPEC TT-B-1325D Beads (Glass Spheres) Retro-Reflective

FED SPEC TT-P-1952FPaint, Traffic and Airfield Marking, Waterborne

FED STD 595 Colors used in Government Procurement

Commercial Item Description

A-A-2886B Paint, Traffic, Solvent Based

Advisory Circulars (AC)

AC 150/5340-1 Standards for Airport Markings

AC 150/5320-12 Measurement, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces

END OF ITEM P-620

ITEM F-162

CHAIN-LINK FENCES

ITEM F-162, "CHAIN-LINK FENCES" is a technical specification contained in Federal Aviation Administration Advisory Circular – 150/5370-10h, "Standard Specifications for Construction of Airports."

This item has been modified to make allowances for local materials, methods and requirements. This item has been updated and modified to comply with the latest editions of other applicable codes, from knowledge gained on other airport construction projects and valuable lessons learned from airport maintenance staffs.

Deletions are noted by the ~~strikethrough~~ method.

Changes and additions are noted by the ***bold italic*** method.

ITEM F-162

CHAIN-LINK FENCE

DESCRIPTION

162-1.1 This item shall consist of furnishing and erecting a chain-link fence in accordance with these specifications, the details shown on the plans, and in conformity with the lines and grades shown on the plans or established by the RPR.

MATERIALS

162-2.1 Fabric. The fabric shall be woven with a 9-gauge galvanized steel wire in a 2-inch (50 mm) mesh and shall meet the requirements of ASTM A392, Class 2.

162-2.2 Barbed wire. Barbed wire shall be ~~2-strand~~ ***3-strand*** 12-1/2 gauge zinc-coated wire with 4-point barbs and shall conform to the requirements of ASTM A121, Class 3, Chain Link Fence Grade.

162-2.3 Posts, rails, and braces. Line posts, rails, and braces shall conform to the requirements of ASTM F1043 or ASTM F1083 as follows:

- Galvanized tubular steel pipe shall conform to the requirements of Group IA, (Schedule 40) coatings conforming to Type A, or Group IC (High Strength Pipe), External coating Type B, and internal coating Type B or D.

Posts, rails, and braces, with the exception of galvanized steel conforming to ASTM F1043 or ASTM F1083, Group 1A, Type A, or aluminum alloy, shall demonstrate the ability to withstand testing in salt spray in accordance with ASTM B117 as follows:

- External: 1,000 hours with a maximum of 5% red rust.

- Internal: 650 hours with a maximum of 5% red rust.

The dimensions of the posts, rails, and braces shall be in accordance with Tables I through VI of Federal Specification RR-F-191/3.

162-2.4 Gates. Gate frames shall consist of galvanized steel pipe and shall conform to the specifications for the same material under paragraph 162-2.3. The fabric shall be of the same type material as used in the fence.

162-2.5 Wire ties and tension wires. Wire ties for use in conjunction with a given type of fabric shall be of the same material and coating weight identified with the fabric type. Tension wire shall be 7-gauge marcelled steel wire with the same coating as the fabric type and shall conform to ASTM A824.

All material shall conform to Federal Specification RR-F-191/4.

162-2.6 Miscellaneous fittings and hardware. Miscellaneous steel fittings and hardware for use with zinc-coated steel fabric shall be of commercial grade steel or better quality, wrought or cast as appropriate to the article, and sufficient in strength to provide a balanced design when used in conjunction with fabric posts, and wires of the quality specified herein. All steel fittings and hardware shall be protected with a zinc coating applied in conformance with ASTM A153. Barbed wire support

arms shall withstand a load of 250 pounds (113 kg) applied vertically to the outermost end of the arm.

162-2.7 Concrete. Concrete shall have a minimum 28-day compressive strength of 3000 psi (2670 kPa).

162-2.8 Marking. Each roll of fabric shall carry a tag showing the kind of base metal (steel, aluminum, or aluminum alloy number), kind of coating, the gauge of the wire, the length of fencing in the roll, and the name of the manufacturer. Posts, wire, and other fittings shall be identified as to manufacturer, kind of base metal (steel, aluminum, or aluminum alloy number), and kind of coating.

CONSTRUCTION METHODS

162-3.1 General. The fence shall be constructed in accordance with the details on the plans and as specified here using new materials. All work shall be performed in a workmanlike manner satisfactory to the RPR. The Contractor shall layout the fence line based on the plans. The Contractor shall span the opening below the fence with barbed wire at all locations where it is not practical to conform the fence to the general contour of the ground surface because of natural or manmade features such as drainage ditches. The new fence shall be permanently tied to the terminals of existing fences as shown on the plans. The Contractor shall stake down the woven wire fence at several points between posts as shown on the plans.

The Contractor shall arrange the work so that construction of the new fence will immediately follow the removal of existing fences. The length of unfenced section at any time shall not exceed 300 feet (90 m). The work shall progress in this manner and at the close of the working day the newly constructed fence shall be tied to the existing fence.

162-3.2 Clearing fence line. Clearing shall consist of the removal of all stumps, brush, rocks, trees, or other obstructions that will interfere with proper construction of the fence. Stumps within the cleared area of the fence shall be grubbed or excavated. The bottom of the fence shall be placed a uniform distance above ground, as specified in the plans. When shown on the plans or as directed by the RPR, the existing fences which interfere with the new fence location shall be removed by the Contractor as a part of the construction work unless such removal is listed as a separate item in the bid schedule. All holes remaining after post and stump removal shall be refilled with suitable soil, gravel, or other suitable material and compacted with tampers.

The cost of removing and disposing of the material shall not constitute a pay item and shall be considered incidental to fence construction.

162-3.3 Installing posts. All posts shall be set in concrete at the required dimension and depth and at the spacing shown on the plans.

The concrete shall be thoroughly compacted around the posts by tamping or vibrating and shall have a smooth finish slightly higher than the ground and sloped to drain away from the posts. All posts shall be set plumb and to the required grade and alignment. No materials shall be installed on the posts, nor shall the posts be disturbed in any manner within seven (7) days after the individual post footing is completed.

Should rock be encountered at a depth less than the planned footing depth, a hole 2 inches (50 mm) larger than the greatest dimension of the posts shall be drilled to a depth of 12 inches (300 mm). After the posts are set, the remainder of the drilled hole shall be filled with grout, composed of one part Portland cement and two parts mortar sand. Any remaining space above the rock shall be filled with concrete in the manner described above.

In lieu of drilling, the rock may be excavated to the required footing depth. No extra compensation shall be made for rock excavation.

162-3.4 Installing top rails. The top rail shall be continuous and shall pass through the post tops. The coupling used to join the top rail lengths shall allow for expansion.

162-3.5 Installing braces. Horizontal brace rails, with diagonal truss rods and turnbuckles, shall be installed at all terminal posts.

162-3.6 Installing fabric. The wire fabric shall be firmly attached to the posts and braced as shown on the plans. All wire shall be stretched taut and shall be installed to the required elevations. The fence shall generally follow the contour of the ground, with the bottom of the fence fabric no less than one inch (25 mm) or more than 4 inches (100 mm) from the ground surface. Grading shall be performed where necessary to provide a neat appearance.

At locations of small natural swales or drainage ditches and where it is not practical to have the fence conform to the general contour of the ground surface, longer posts may be used and multiple strands of barbed wire stretched to span the opening below the fence. The vertical clearance between strands of barbed wire shall be 6 inches (150 mm) or less.

162-3.7 Electrical grounds. Electrical grounds shall be constructed at 500 feet (150 m) intervals**.** The ground shall be accomplished with a copper clad rod 8 feet (2.4 m) long and a minimum of 5/8 inches (16 mm) in diameter driven vertically until the top is 6 inches (150 mm) below the ground surface. A No. 6 solid copper conductor shall be clamped to the rod and to the fence in such a manner that each element of the fence is grounded. Installation of ground rods shall not constitute a pay item and shall be considered incidental to fence construction. The Contractor shall comply with FAA-STD-019, Lightning and Surge Protection, Grounding, Bonding and Shielding Requirements for Facilities and Electronic Equipment, paragraph 4.2.3.8, Lightning Protection for Fences and Gates, when fencing is adjacent to FAA facilities.

162-3.8 Cleaning up. The Contractor shall remove from the vicinity of the completed work all tools, buildings, equipment, etc., used during construction. All disturbed areas shall be ~~seeded per T-901~~ ***sodded per T-904***.

METHOD OF MEASUREMENT

162-4.1 Chain-link fence will be measured for payment by the linear foot (meter). Measurement will be along the top of the fence from center to center of end posts, excluding the length occupied by gate openings.

162-4.2 Gates will be measured as complete units.

BASIS OF PAYMENT

162-5.1 Payment for chain-link fence will be made at the contract unit price per linear foot (meter).

~~**162-5.2** Payment for vehicle or pedestrian gates will be made at the contract unit price for each gate.~~

The owner shall provide AOA fence fabric. The price ***of AOA Fence Installation*** shall be full compensation for furnishing all ***other*** materials, and for all preparation, erection, and installation of these materials ***including gates***, and for all labor equipment, tools, and incidentals necessary to complete the item.

The price for removal of existing fence shall be made at the contract unit price per linear foot (meter).

Payment will be made under:

~~Item F-162-5.1~~	~~Chain Link Fence~~	~~per linear foot (meter)~~
~~Item F-162-5.2a~~	~~Vehicle Gates~~	~~per each~~
~~Item F-162-5.2b~~	~~Pedestrian Gates~~	~~per each~~
Item F-162-1	***7' + 1' AOA Fence***	***--per Linear Foot (LF)***
Item F-162-2	***24' Manual Double Swing Gate, 7' + 1'***	***--per Each (EA)***
Item F-162-3	***5' Pedestrian Swing Gate***	***--per Each (EA)***
Item F-162-4	***24' Automatic Sliding Gate, 7' + 1'***	***--per Each (EA)***

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM A121	Standard Specification for Metallic-Coated Carbon Steel Barbed Wire
ASTM A153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A392	Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric
ASTM A491	Standard Specification for Aluminum-Coated Steel Chain-Link Fence Fabric
ASTM A824	Standard Specification for Metallic-Coated Steel Marcelled Tension Wire for Use with Chain Link Fence
ASTM B117	Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM F668	Standard Specification for Polyvinyl Chloride (PVC), Polyolefin and other Organic Polymer Coated Steel Chain-Link Fence Fabric
ASTM F1043	Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework
ASTM F1083	Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
ASTM F1183	Standard Specification for Aluminum Alloy Chain Link Fence Fabric
ASTM F1345	Standard Specification for Zinc 5% Aluminum-Mischmetal Alloy Coated Steel Chain-Link Fence Fabric

ASTM G152 Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

ASTM G153 Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

ASTM G154 Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

ASTM G155 Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials

Federal Specifications (FED SPEC)

FED SPEC RR-F-191/3 Fencing, Wire and Post, Metal (Chain-Link Fence Posts, Top Rails and Braces)

FED SPEC RR-F-191/4 Fencing, Wire and Post, Metal (Chain-Link Fence Accessories)

FAA Standard

FAA-STD-019 Lightning and Surge Protection, Grounding, Bonding and Shielding Requirements for Facilities and Electronic Equipment

FAA Orders

5300.38 AIP Handbook

END OF ITEM F-162

ITEM D-701

PIPE FOR STORM DRAINS AND CULVERTS

ITEM D-701, "PIPE FOR STORM DRAINS AND CULVERTS" is a technical specification contained in Federal Aviation Administration Advisory Circular – 150/5370-10H, "Standard Specifications for Construction of Airports."

This item has been modified to make allowances for local materials, methods and requirements. This item has been updated and modified to comply with the latest editions of other applicable codes, from knowledge gained on other airport construction projects and valuable lessons learned from airport maintenance staffs.

Deletions are noted by the ~~strikethrough~~ method.

Changes and additions are noted by the ***bold italic*** method.

ITEM D-701

PIPE FOR STORM DRAINS AND CULVERTS

DESCRIPTION

701-1.1 This item shall consist of the construction of pipe culverts and storm drains in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans.

MATERIALS

701-2.1 Materials shall meet the requirements shown on the plans and specified below. Underground piping and components used in drainage systems for terminal and aircraft fueling ramp drainage shall be noncombustible and inert to fuel in accordance with National Fire Protection Association (NFPA) 415.

701-2.2 Pipe. The pipe shall be of the type called for on the plans or in the proposal and shall be in accordance with the following appropriate requirements:

AASHTO R73	Standard Practice for Evaluation of Precast Concrete Drainage Productions
ASTM C14	Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM C76	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C507	Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe
ASTM C1433	Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers
ASTM C1479	Standard Practice for Installation of Precast Concrete Sewer, Storm Drain, and Culvert Pipe Using Standard Installations
ASTM C1577	Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers Designed According to AASHTO LRFD
ASTM C1786	Standard Specification for Segmental Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers Designed According to AASHTO LRFD
ASTM C1840	Standard Practice for Inspection and Acceptance of Installed Reinforced Concrete Culvert, Storm Drain, and Storm Sewer Pipe

701-2.3 Concrete. Not used.

701-2.4 Rubber gaskets. Not used.

701-2.5 Joint mortar. Pipe joint mortar shall consist of one part Portland cement and two parts sand. The Portland cement shall conform to the requirements of ASTM C150, Type I. The sand shall conform to the requirements of ASTM C144.

701-2.6 Joint fillers. Poured filler for joints shall conform to the requirements of ASTM D6690.

701-2.7 Plastic gaskets. Not used.

701-2.8 Controlled low-strength material (CLSM). Not used.

701-2.9 Precast box culverts. Manufactured in accordance with and conforming to ASTM C1433.

701-2.10 Precast concrete pipe. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or American Concrete Pipe Association QCast Plant Certification program.

CONSTRUCTION METHODS

701-3.1 Excavation. The width of the pipe trench shall be sufficient to permit satisfactory jointing of the pipe and thorough tamping of the bedding material under and around the pipe, but it shall not be less than the external diameter of the pipe plus 12 inches (300 mm) on each side. The trench walls shall be approximately vertical.

The Contractor shall comply with all current federal, state and local rules and regulations governing the safety of men and materials during the excavation, installation and backfilling operations. Specifically, the Contractor shall observe that all requirements of the Occupational Safety and Health Administration (OSHA) relating to excavations, trenching and shoring are strictly adhered to. The width of the trench shall be sufficient to permit satisfactorily jointing of the pipe and thorough compaction of the bedding material under the pipe and backfill material around the pipe, but it shall not be greater than the widths shown on the plans trench detail.

Where rock, hardpan, or other unyielding material is encountered, the Contractor shall remove it from below the foundation grade for a depth of at least 8 inch (200 mm) or 1/2 inch (12 mm) for each foot of fill over the top of the pipe (whichever is greater) but for no more than three-quarters of the nominal diameter of the pipe. The excavation below grade should be filled with granular material to form a uniform foundation.

Where a firm foundation is not encountered at the grade established, due to soft, spongy, or other unstable soil, the unstable soil shall be removed and replaced with approved granular material for the full trench width. The RPR shall determine the depth of removal necessary. The granular material shall be compacted to provide adequate support for the pipe.

The excavation for pipes placed in embankment fill shall not be made until the embankment has been completed to a height above the top of the pipe as shown on the plans.

701-3.2 Bedding. The bedding surface for the pipe shall provide a foundation of uniform density to support the pipe throughout its entire length.

a. **Rigid pipe.** The pipe bedding shall be constructed uniformly for the full length of the pipe barrel, as required on the plans. The maximum aggregate size shall be 1 in when the bedding thickness is less than 6 inches, and 1-1/2 in when the bedding thickness is greater

than 6 inches. Bedding shall be loosely placed uncompacted material under the middle third of the pipe prior to placement of the pipe.

b. Flexible pipe. For flexible pipe, the bed shall be roughly shaped to fit the pipe, and a bedding blanket of sand or fine granular material shall be provided as follows:

Flexible Pipe Bedding

Pipe Corrugation Depth		Minimum Bedding Depth	
inch	**mm**	**inch**	**mm**
1/2	12	1	25
1	25	2	50
2	50	3	75
2-1/2	60	3-1/2	90

c. Other pipe materials. For PVC, polyethylene, polypropylene, or fiberglass pipe, the bedding material shall consist of coarse sands and gravels with a maximum particle size of 3/4 inches (19 mm). For pipes installed under paved areas, no more than 12% of the material shall pass the No. 200 (0.075 mm) sieve. For all other areas, no more than 50% of the material shall pass the No. 200 (0.075 mm) sieve. The bedding shall have a thickness of at least 6 inches (150 mm) below the bottom of the pipe and extend up around the pipe for a depth of not less than 50% of the pipe's vertical outside diameter.

701-3.3 Laying pipe. The pipe laying shall begin at the lowest point of the trench and proceed upgrade. The lower segment of the pipe shall be in contact with the bedding throughout its full length. Bell or groove ends of rigid pipes and outside circumferential laps of flexible pipes shall be placed facing upgrade.

Paved or partially lined pipe shall be placed so that the longitudinal center line of the paved segment coincides with the flow line.

Elliptical and elliptically reinforced concrete pipes shall be placed with the manufacturer's reference lines designating the top of the pipe within five degrees of a vertical plane through the longitudinal axis of the pipe.

701-3.4 Joining pipe. Joints shall be made with (1) cement mortar, (2) cement grout, (3) rubber gaskets, (4) plastic gaskets, (5) coupling bands.

Mortar joints shall be made with an excess of mortar to form a continuous bead around the outside of the pipe and shall be finished smooth on the inside. Molds or runners shall be used for grouted joints to retain the poured grout. Rubber ring gaskets shall be installed to form a flexible watertight seal.

a. Concrete pipe. Concrete pipe may be either bell and spigot or tongue and groove. Pipe sections at joints shall be fully seated and the inner surfaces flush and even. Concrete pipe joints shall be sealed with butyl mastic meeting ASTM C990 or mortar when soil tight joints are required. Joints shall be thoroughly wetted before applying mortar or grout.

b. Metal pipe. Metal pipe shall be firmly joined by form-fitting bands conforming to the requirements of ASTM A760 for steel pipe and AASHTO M196 for aluminum pipe.

c. **PVC, Polyethylene, or Polypropylene pipe.** Joints for PVC, Polyethylene, or Polypropylene pipe shall conform to the requirements of ASTM D3212 when leak resistant joints are required. Joints for PVC and Polyethylene pipe shall conform to the requirements of AASHTO M304 when soil tight joints are required. Fittings for polyethylene pipe shall conform to the requirements of AASHTO M252 or ASTM M294. Fittings for polypropylene pipe shall conform to ASTM F2881, ASTM F2736, or ASTM F2764.

d. **Fiberglass pipe.** Joints and fittings shall be as detailed on the plans and in accordance with the manufacturers recommendations. Joints shall meet the requirements of ASTM D4161 for flexible elastomeric seals.

701-3.5 Embedment and Overfill. Pipes shall be inspected before any fill material is placed; any pipes found to be out of alignment, unduly settled, or damaged shall be removed and re-laid or replaced at the Contractor's expense.

701-3.5-1 Embedment Material Requirements

a. **Concrete Pipe.** Embedment material and compaction requirements shall be in accordance with the applicable Type of Standard Installation (Types 1, 2, 3, or 4) per ASTM C1479. If a concrete cradle or CLSM embedment material is used, it shall conform to the plan details.

b. **Plastic and fiberglass Pipe.** Embedment material shall meet the requirements of ASTM D3282, A-1, A-2-4, A-2-5, or A-3. Embedment material shall be free of organic material, stones larger than 1.5 inches in the greatest dimension, or frozen lumps. Embedment material shall extend to 12 inches above the top of the pipe.

c. **Metal Pipe.** Embedment material shall be granular as specified in the contract document and specifications, and shall be free of organic material, rock fragments larger than 1.5 inches in the greatest dimension and frozen lumps. As a minimum, backfill materials shall meet the requirements of ASTM D3282, A-1, A-2, or A-3. Embedment material shall extend to 12 inches above the top of the pipe.

701-3.5-2 Placement of Embedment Material The embedment material shall be compacted in layers not exceeding 6 inches (150 mm) on each side of the pipe and shall be brought up one foot (30 cm) above the top of the pipe or to natural ground level, whichever is greater. Thoroughly compact the embedment material under the haunches of the pipe without displacing the pipe. Material shall be brought up evenly on each side of the pipe for the full length of the pipe.

When the top of the pipe is above the top of the trench, the embedment material shall be compacted in layers not exceeding 6 inches (150 mm) and shall be brought up evenly on each side of the pipe to one foot (30 cm) above the top of the pipe. All embedment material shall be compacted to a density required under Item P-152.

Concrete cradles and flowable fills, such as controlled low strength material (CLSM) or controlled density fill (CDF), may be used for embedment provided adequate flotation resistance can be achieved by restraints, weighing, or placement technique.

It shall be the Contractor's responsibility to protect installed pipes and culverts from damage due to construction equipment operations. The Contractor shall be responsible for installation of any extra strutting or backfill required to protect pipes from the construction equipment.

701-3.6 Overfill
Pipes shall be inspected before any overfill is in place. Any pipes found to be out of alignment, unduly settled, or damaged shall be removed and relaid or replaced at the Contractor's expense. Evaluation of any damage to RCP shall be evaluated based on AASHTO R73.

Overfill material shall be place and compacted in layers as required to achieve compaction to at least 95 percent standard proctor per ASTM D698. The soil shall contain no debris, organic matter, frozen material, or stones with a diameter greater than one half the thickness of the compacted layers being placed.

701-3.7 Inspection Requirements
An initial post installation inspection shall be performed by the RPR no sooner than 30 days after completion of installation and final backfill. Clean or flush all lines prior to inspection.

Incorporate specific inspection requirements for the various types of pipes beneath the general inspection requirements.

Reinforced concrete pipe shall be inspected, evaluated, and reported on in accordance with ASTM C1840, "Standard Practice for Inspection and Acceptance of Installed Reinforced Concrete Culvert, Storm Drain, and Storm Sewer Pipe." Any issues reported shall include still photo and video documentation. The zoom ratio shall be provided for all still or video images that document any issues of concern by the inspection firm.

METHOD OF MEASUREMENT

701-4.1 The length of pipe shall be measured in linear feet (m) of pipe in place, completed, and accepted. It shall be measured along the centerline of the pipe from end or inside face of structure to the end or inside face of structure, whichever is applicable. The each class and size of pipes shall be measured separately. All fittings shall be included in the footage as typical pipe sections in the pipe being measured.

701-4.2. Not used.

701-4.3 Not used.

701-4.4 Not used.

BASIS OF PAYMENT

701-5.0 These prices shall fully compensate the Contractor for furnishing all materials and for all preparation, excavation, and installation of these materials; and for all labor, equipment, tools, and incidentals necessary to complete the item.

701-5.1 Payment will be made at the contract unit price per linear foot (meter) for each class and size of pipe.

701-5.2 Not used

701-5.3 Not used.

701-5.4 Not used.

Payment will be made under:

~~Item 701-5.1 [ ] inch [ ] - per linear foot (meter)~~

~~Item 701-5.2 Not used~~

~~Item 701-5.3 Not used.~~

~~Item 701-5.4 Not used.~~

Item D-701-1 18" RCP, Class III --per Linear Foot (LF)

Item D-701-2 24" ADS, N-12 --per Linear Foot (LF)

Item D-701-3 36" RCP, Class III --per Linear Foot (LF)

Item D-701-4 42" RCP, Class III --per Linear Foot (LF)

Item D-701-5 42" MES with 15' X 15' RIP RAP --per Each (EA)

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M167 Standard Specification for Corrugated Steel Structural Plate, Zinc-Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches

AASHTO M190 Standard Specification for Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches

AASHTO M196 Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains

AASHTO M219 Standard Specification for Corrugated Aluminum Alloy Structural Plate for Field-Bolted Pipe, Pipe-Arches, and Arches

AASHTO M243 Standard Specification for Field Applied Coating of Corrugated Metal Structural Plate for Pipe, Pipe-Arches, and Arches

AASHTO M252 Standard Specification for Corrugated Polyethylene Drainage Pipe

AASHTO M294 Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter

AASHTO M304 Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter

AASHTO MP20 Standard Specification for Steel Reinforced Polyethylene (PE) Ribbed Pipe, 300- to 900-mm (12- to 36-in.) Diameter

ASTM A760	Standard Specification for Corrugated Steel Pipe, Metallic Coated for Sewers and Drains
ASTM A761	Standard Specification for Corrugated Steel Structural Plate, Zinc Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches
ASTM A762	Standard Specification for Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains
ASTM A849	Standard Specification for Post-Applied Coatings, Pavings, and Linings for Corrugated Steel Sewer and Drainage Pipe
ASTM B745	Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains
ASTM C14	Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM C76	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C94	Standard Specification for Ready Mixed Concrete
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C443	Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C506	Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe
ASTM C507	Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe
ASTM C655	Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain and Sewer Pipe
ASTM C990	Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
ASTM C1433	Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers
ASTM D1056	Standard Specification for Flexible Cellular Materials Sponge or Expanded Rubber
ASTM D3034	Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D3212	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

ASTM D3262 Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Sewer Pipe

ASTM D3282 Standard Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes

ASTM D4161 Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Pipe Joints Using Flexible Elastomeric Seals

ASTM D6690 Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements

ASTM F477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

ASTM F667 Standard Specification for 3 through 24 in. Corrugated Polyethylene Pipe and Fittings

ASTM F714 Standard Specification for Polyethylene (PE) Plastic Pipe (DR PR) Based on Outside Diameter

ASTM F794 Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe & Fittings Based on Controlled Inside Diameter

ASTM F894 Standard Specification for Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe

ASTM F949 Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings

ASTM F2435 Standard Specification for Steel Reinforced Polyethylene (PE) Corrugated Pipe

ASTM F2562 Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage

ASTM F2736 Standard Specification for 6 to 30 in. (152 to 762 mm) Polypropylene (PP) Corrugated Single Wall Pipe and Double Wall Pipe

ASTM F2764 Standard Specification for 30 to 60 in. (750 to 1500 mm) Polypropylene (PP) Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications

ASTM F2881 Standard Specification for 12 to 60 in. (300 to 1500 mm) Polypropylene (PP) Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications

National Fire Protection Association (NFPA)

NFPA 415 Standard on Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways

END ITEM D-701

ITEM D-751

MANHOLES, CATCH BASINS, INLETS, AND INSPECTION HOLES

ITEM D-751, "MANHOLES, CATCH BASINS, INLETS, AND INSPECTION HOLES" is a technical specification contained in Federal Aviation Administration Advisory Circular – 150/5370-10H, "Standard Specifications for Construction of Airports."

This item has been modified to make allowances for local materials, methods and requirements. This item has been updated and modified to comply with the latest editions of other applicable codes, from knowledge gained on other airport construction projects and valuable lessons learned from airport maintenance staffs.

Deletions are noted by the ~~strikethrough~~ method.

Changes and additions are noted by the ***bold italic*** method.

ITEM D-751

MANHOLES, CATCH BASINS, INLETS, AND INSPECTION HOLES

DESCRIPTION

751-1.1 This item shall consist of construction of manholes, catch basins, inlets, and inspection holes, in accordance with these specifications, at the specified locations and conforming to the lines, grades, and dimensions shown on the plans or required by the RPR.

MATERIALS

751-2.1 Brick. The brick shall conform to the requirements of ASTM C 32, Grade MS.

751-2.2 Mortar. Mortar shall consist of one part Portland cement and two parts sand. The Portland cement shall conform to the requirements of ASTM C150, Type I. The sand shall conform to the requirements of ASTM C144.

751-2.3 Concrete. Plain and reinforced concrete used in structures, connections of pipes with structures, and the support of structures or frames shall conform to the requirements of Item P-610.

751-2.4 Precast Concrete Pipe Manhole Rings. Precast concrete pipe manhole rings shall conform to the requirements of ASTM C478. Unless otherwise specified, the risers and offset cone sections shall have an inside diameter of not less than 36 inches (90 cm) nor more than 48 inches (120 cm). There shall be a gasket between individual sections and sections cemented together with mortar on the inside of the manhole.

751-2.5 Corrugated Metal. Corrugated metal shall conform to the requirements of American Association of State Highway and Transportation Officials (AASHTO) M36.

751-2.6 Frames, Covers, And Grates. The castings shall conform to one of the following requirements:

a. ASTM A48, Class 35B: Gray iron castings

b. ASTM A47: Malleable iron castings

c. ASTM A27: Steel castings

d. ASTM A283, Grade D: Structural steel for grates and frames

e. ASTM A536, Grade 65-45-12: Ductile iron castings

f. ASTM A897: Austempered ductile iron castings

All castings or structural steel units shall conform to the dimensions shown on the plans and shall be designed to support the loadings, aircraft gear configuration and/or direct loading, specified.

Each frame and cover or grate unit shall be provided with fastening members to prevent it from being dislodged by traffic but which will allow easy removal for access to the structure.

All castings shall be thoroughly cleaned. After fabrication, structural steel units shall be galvanized to meet the requirements of ASTM A123.

751-2.7 Steps. The steps or ladder bars shall be gray or malleable cast iron or galvanized steel. The steps shall be the size, length, and shape shown on the plans and those steps that are not galvanized shall be given a coat of bituminous paint, when directed.

751-2.8 Precast inlet structures. Manufactured in accordance with and conforming to ASTM C913.

CONSTRUCTION METHODS

751-3.1 Unclassified Excavation.

a. The Contractor shall excavate for structures and footings to the lines and grades or elevations, shown on the plans, or as staked by the RPR. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown. The elevations of the bottoms of footings, as shown on the plans, shall be considered as approximately only; and the RPR may direct, in writing, changes in dimensions or elevations of footings necessary for a satisfactory foundation.

b. Boulders, logs, or any other objectionable material encountered in excavation shall be removed. All rock or other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped, or serrated, as directed by the RPR. All seams or crevices shall be cleaned out and grouted. All loose and disintegrated rock and thin strata shall be removed. Where concrete will rest on a surface other than rock, the bottom of the excavation shall not be disturbed and excavation to final grade shall not be made until immediately before the concrete or reinforcing is placed.

c. The Contractor shall do all bracing, sheathing, or shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheathing, or shoring shall be included in the unit price bid for the structure.

d. All bracing, sheathing, or shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall not disturb or damage finished masonry. The cost of removal shall be included in the unit price bid for the structure.

e. After excavation is completed for each structure, the Contractor shall notify the RPR. No concrete or reinforcing steel shall be placed until the RPR has approved the depth of the excavation and the character of the foundation material.

751-3.2 Brick Structures.

a. Foundations. A prepared foundation shall be placed for all brick structures after the foundation excavation is completed and accepted. Unless otherwise specified, the base shall consist of reinforced concrete mixed, prepared, and placed in accordance with the requirements of Item P-610.

b. Laying brick. All brick shall be clean and thoroughly wet before laying so that they will not absorb any appreciable amount of additional water at the time they are laid. All brick shall be laid in freshly made mortar. Mortar not used within 45 minutes after water has been added shall be discarded. Retempering of mortar shall not be permitted. An ample layer of mortar shall be spread on the beds and a shallow furrow shall be made in it that can be readily closed by the laying of the brick. All bed and head joints shall be filled solid with mortar. End joints of stretchers and side or cross joints of headers shall be fully buttered with mortar and a shoved joint made to squeeze out mortar at the top of the joint.

Any bricks that may be loosened after the mortar has taken its set, shall be removed, cleaned, and re-laid with fresh mortar. No broken or chipped brick shall be used in the face, and no spalls or bats shall be used except where necessary to shape around irregular openings or edges; in which case, full bricks shall be placed at ends or corners where possible, and the bats shall be used in the interior of the course. In making closures, no piece of brick shorter than the width of a whole brick shall be used; and wherever practicable, whole brick shall be used and laid as headers.

c. **Joints.** All joints shall be filled with mortar at every course Exterior faces shall be laid up in advance of backing. Exterior faces shall be plastered or parged with a coat of mortar not less than 3/8 inch (9 mm) thick before the backing is laid up. Prior to parging, all joints on the back of face courses shall be cut flush. Unless otherwise noted, joints shall be not less than 1/4 inch (6 mm) nor more than 1/2 inch (12 mm) wide and the selected joint width shall be maintained uniform throughout the work.

d. **Pointing.** Face joints shall be neatly struck, using the weather-struck joint. All joints shall be finished properly as the laying of the brick progresses. When nails or line pins are used the holes shall be immediately plugged with mortar and pointed when the nail or pin is removed.

e. **Cleaning.** Upon completion of the work all exterior surfaces shall be thoroughly cleaned by scrubbing and washing with water. If necessary to produce satisfactory results, cleaning shall be done with a 5% solution of muriatic acid which shall then be rinsed off with liberal quantities of water.

f. **Curing and cold weather protection.** The brick masonry shall be protected and kept moist for at least 48 hours after laying the brick. Brick masonry work or pointing shall not be done when there is frost on the brick or when the air temperature is below 50°F (10°C) unless the Contractor has, on the project ready to use, suitable covering and artificial heating devices necessary to keep the atmosphere surrounding the masonry at a temperature of not less than 60°F (16°C) for the duration of the curing period.

751-3.3 Concrete Structures. Concrete structures which are to be cast in place within the project boundaries shall be built on prepared foundations, conforming to the dimensions and shape indicated on the plans. The construction shall conform to the requirements specified in Item P-610. Any reinforcement required shall be placed as indicated on the plans and shall be approved by the RPR before the concrete is placed.

All invert channels shall be constructed and shaped accurately to be smooth, uniform, and cause minimum resistance to flowing water. The interior bottom shall be sloped to the outlet.

751-3.4 Precast Concrete Pipe Structures. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another RPR approved third party certification program.

Precast concrete structures shall conform to ASTM C478. Precast concrete structures shall be constructed on prepared or previously placed slab foundations conforming to the dimensions and locations shown on the plans. All precast concrete sections necessary to build a completed structure shall be furnished. The different sections shall fit together readily. Joints between precast concrete risers and tops shall be full-bedded in cement mortar and shall (1) be smoothed to a uniform surface on both interior and exterior of the structure or (2) utilize a rubber gasket per ASTM C443. The top of the upper precast concrete section shall be suitably formed and dimensioned to receive the metal frame and cover or grate, or other cap, as required. Provision

shall be made for any connections for lateral pipe, including drops and leads that may be installed in the structure. The flow lines shall be smooth, uniform, and cause minimum resistance to flow. The metal or metal encapsulated steps that are embedded or built into the side walls shall be aligned and placed in accordance to ASTM C478. When a metal ladder replaces the steps, it shall be securely fastened into position.

751-3.5 Corrugated Metal Structures. Corrugated metal structures shall be prefabricated. All standard or special fittings shall be furnished to provide pipe connections or branches with the correct dimensions and of sufficient length to accommodate connecting bands. The fittings shall be welded in place to the metal structures. The top of the metal structure shall be designed so that either a concrete slab or metal collar may be attached to allow the fastening of a standard metal frame and grate or cover. Steps or ladders shall be furnished as shown on the plans. Corrugated metal structures shall be constructed on prepared foundations, conforming to the dimensions and locations as shown on the plans. When indicated, the structures shall be placed on a reinforced concrete base.

751-3.6 Inlet And Outlet Pipes. Inlet and outlet pipes shall extend through the walls of the structures a sufficient distance beyond the outside surface to allow for connections. They shall be cut off flush with the wall on the inside surface of the structure, unless otherwise directed. For concrete or brick structures, mortar shall be placed around these pipes to form a tight, neat connection.

751-3.7 Placement And Treatment Of Castings, Frames, And Fittings. All castings, frames, and fittings shall be placed in the positions indicated on the plans or as directed by the RPR, and shall be set true to line and elevation. If frames or fittings are to be set in concrete or cement mortar, all anchors or bolts shall be in place before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete has set.

When frames or fittings are placed on previously constructed masonry, the bearing surface of the masonry shall be brought true to line and grade and shall present an even bearing surface so the entire face or back of the unit will come in contact with the masonry. The unit shall be set in mortar beds and anchored to the masonry as indicated on the plans or as directed by the RPR. All units shall set firm and secure.

After the frames or fittings have been set in final position, the concrete or mortar shall be allowed to harden for seven (7) days before the grates or covers are placed and fastened down

751-3.8 Installation Of Steps. The steps shall be installed as indicated on the plans or as directed by the RPR. When the steps are to be set in concrete, they shall be placed and secured in position before the concrete is placed. When the steps are installed in brick masonry, they shall be placed as the masonry is being built. The steps shall not be disturbed or used until the concrete or mortar has hardened for at least seven (7) days. After seven (7) days, the steps shall be cleaned and painted, unless they have been galvanized.

When steps are required with precast concrete structures, they shall meet the requirements of ASTM C478. The steps shall be cast into the side of the sections at the time the sections are manufactured or set in place after the structure is erected by drilling holes in the concrete and cementing the steps in place.

When steps are required with corrugated metal structures, they shall be welded into aligned position at a vertical spacing of 12 inches (300 mm).

Instead of steps, prefabricated ladders may be installed. For brick or concrete structures, the ladder shall be held in place by grouting the supports in drilled holes. For metal structures, the ladder shall be secured by welding the top support to the structure and grouting the bottom support into drilled holes in the foundation or as directed by the RPR.

751-3.9 Backfilling.

a. After a structure has been completed, the area around it shall be backfilled with approved material, in horizontal layers not to exceed 8 inches (200 mm) in loose depth, and compacted to the density required in Item P-152. Each layer shall be deposited evenly around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the RPR.

b. Backfill shall not be placed against any structure until approved by the RPR. For concrete structures, approval shall not be given until the concrete has been in place seven (7) days, or until tests establish that the concrete has attained sufficient strength to withstand any pressure created by the backfill and placing methods.

c. Backfill shall not be measured for direct payment. Performance of this work shall be considered an obligation of the Contractor covered under the contract unit price for the structure involved.

751-3.10 Cleaning And Restoration Of Site. After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site. Surplus dirt may be deposited in embankments, shoulders, or as approved by the RPR. The Contractor shall restore all disturbed areas to their original condition. The Contractor shall remove all tools and equipment, leaving the entire site free, clear, and in good condition.

METHOD OF MEASUREMENT

751-4.1 Manholes, catch basins, inlets, and inspection holes shall be measured by the unit.

BASIS OF PAYMENT

751-5.1 The accepted quantities of manholes, catch basins, inlets, and inspection holes will be paid for at the contract unit price per each in place when completed. This price shall be full compensation for furnishing all materials and for all preparation, excavation, backfilling and placing of the materials; furnishing and installation of such specials and connections to pipes and other structures as may be required to complete the item as shown on the plans; and for all labor equipment, tools and incidentals necessary to complete the structure.

Payment will be made under:

~~Item D-751-5.1~~	~~Manholes~~	~~- per each~~
~~Item D-751-5.2~~	~~Catch Basins~~	~~- per each~~
~~Item D-751-5.3~~	~~Inlets~~	~~- per each~~
~~Item D-751-5.4~~	~~Inspection Holes~~	~~- per each~~
Item D751-1	***Type F DBI***	***-per Each (EA)***
Item D751-2	***Type F DBI, Aircraft Rated (50,000 lb Point Load)***	***-per Each (EA)***

Item D-751-3 Type G DBI, Aircraft Rated (50,000 lb Point Load) -per Each (EA)

Item D-751-4 Type F Top, Type J Alt A (8'-0" Dia) Bottom, Aircraft Rated (50,000 lb Point Load) -per Each (EA)

REFERENCES

751-6.1 The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM A27 Standard Specification for Steel Castings, Carbon, for General Application

ASTM A47 Standard Specification for Ferritic Malleable Iron Castings

ASTM A48 Standard Specification for Gray Iron Castings

ASTM A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A283 Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates

ASTM A536 Standard Specification for Ductile Iron Castings

ASTM A897 Standard Specification for Austempered Ductile Iron Castings

ASTM C32 Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale)

ASTM C144 Standard Specification for Aggregate for Masonry Mortar

ASTM C150 Standard Specification for Portland Cement

ASTM C443 Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.

ASTM C478 Standard Specification for Precast Reinforced Concrete Manhole Sections

ASTM C913 Standard Specification for Precast Concrete Water and Wastewater Structures.

American Association of State Highway and Transportation Officials

AASHTO M36 Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains

END OF SECTION D-751

ITEM T-904

SODDING

ITEM T-904, "SODDING" is a technical specification contained in Federal Aviation Administration Advisory Circular – 150/5370-10H, "Standard Specifications for Construction of Airports."

This item has been modified to make allowances for local materials, methods and requirements. This item has been updated and modified to comply with the latest editions of other applicable codes, from knowledge gained on other airport construction projects and valuable lessons learned from airport maintenance staffs.

Deletions are noted by the ~~strikethrough~~ method.

Changes and additions are noted by the ***bold italic*** method.

ITEM T-904

SODDING

DESCRIPTION

904-1.1 This item shall consist of furnishing, hauling, and placing approved live sod on prepared areas in accordance with this specification at the locations shown on the plans or as directed by the RPR.

MATERIALS

904-2.1 Sod. Sod furnished by the Contractor shall have a good cover of living or growing grass. This shall be interpreted to include grass that is seasonally dormant during the cold or dry seasons and capable of renewing growth after the dormant period. All sod shall be obtained from areas where the soil is reasonably fertile and contains a high percentage of loamy topsoil. Sod shall be cut or stripped from living, thickly matted turf relatively free of weeds or other undesirable foreign plants, large stones, roots, or other materials that might be detrimental to the development of the sod or to future maintenance. At least 70% of the plants in the cut sod shall be composed of the species stated in the special provisions, and any vegetation more than 6 inches (150 mm) in height shall be mowed to a height of 3 inches (75 mm) or less before sod is lifted. Sod, including the soil containing the roots and the plant growth showing above, shall be cut uniformly to a thickness not less than that stated in the special provisions.

904-2.2 Lime. Not required.

904-2.3 Fertilizer Not required

904-2.4 Water. The water shall be sufficiently free from oil, acid, alkali, salt, or other harmful materials that would inhibit the growth of grass.

904-2.5 Soil for repairs. The soil for fill and topsoiling of areas to be repaired shall be at least of equal quality to that which exists in areas adjacent to the area to be repaired. The soil shall be relatively free from large stones, roots, stumps, or other materials that will interfere with subsequent sowing of seed, compacting, and establishing turf, and shall be approved by the RPR before being placed.

CONSTRUCTION METHODS

904-3.1 General. Areas to be solid, strip, or spot sodded shall be shown on the plans. Areas requiring special ground surface preparation such as tilling and those areas in a satisfactory condition that are to remain undisturbed shall also be shown on the plans.

Suitable equipment necessary for proper preparation of the ground surface and for the handling and placing of all required materials shall be on hand, in good condition, and shall be approved by the RPR before the various operations are started. The Contractor shall demonstrate to the RPR before starting the various operations that the application of required materials will be made at the specified rates.

904-3.2 Preparing the ground surface. After grading of areas has been completed and before applying fertilizer and limestone, areas to be sodded shall be raked or otherwise cleared of stones larger than 2 inches (50 mm) in any diameter, sticks, stumps, and other debris which might interfere with sodding, growth of grasses, or subsequent maintenance of grass-covered areas. If

any damage by erosion or other causes occurs after grading of areas and before beginning the application of fertilizer and ground limestone, the Contractor shall repair such damage. This may include filling gullies, smoothing irregularities, and repairing other incidental damage.

904-3.3 Applying fertilizer and ground limestone. Following ground surface preparation, fertilizer shall be uniformly spread at a rate which will provide not less than the minimum quantity of each fertilizer ingredient, as stated in the special provisions. If use of ground limestone is required, it shall then be spread at a rate that will provide not less than the minimum quantity stated in the special provisions. These materials shall be incorporated into the soil to a depth of not less than 2 inches (50 mm) by discing, raking, or other suitable methods. Any stones larger than 2 inches (50 mm) in any diameter, large clods, roots, and other litter brought to the surface by this operation shall be removed.

904-3.4 Obtaining and delivering sod. After inspection and approval of the source of sod by the RPR, the sod shall be cut with approved sod cutters to such a thickness that after it has been transported and placed on the prepared bed, but before it has been compacted, it shall have a uniform thickness of not less than 2 inches (50 mm). Sod sections or strips shall be cut in uniform widths, not less than 10 inches (250 mm), and in lengths of not less than 18 inches (0.5 m), but of such length as may be readily lifted without breaking, tearing, or loss of soil. Where strips are required, the sod must be rolled without damage with the grass folded inside. The Contractor may be required to mow high grass before cutting sod.

The sod shall be transplanted within 24 hours from the time it is stripped, unless circumstances beyond the Contractor’s control make storing necessary. In such cases, sod shall be stacked, kept moist, and protected from exposure to the air and sun and shall be kept from freezing. Sod shall be cut and moved only when the soil moisture conditions are such that favorable results can be expected. Where the soil is too dry, approval to cut sod may be granted only after it has been watered sufficiently to moisten the soil to the depth the sod is to be cut.

904-3.5 Laying sod. Sodding shall be performed only during the seasons when satisfactory results can be expected. Frozen sod shall not be used and sod shall not be placed upon frozen soil. Sod may be transplanted during periods of drought with the approval of the RPR, provided the sod bed is watered to moisten the soil to a depth of at least 4 inches (100 mm) immediately prior to laying the sod.

The sod shall be moist and shall be placed on a moist earth bed. Pitch forks shall not be used to handle sod, and dumping from vehicles shall not be permitted. The sod shall be carefully placed by hand, edge to edge and with staggered joints, in rows at right angles to the slopes, commencing at the base of the area to be sodded and working upward. The sod shall immediately be pressed firmly into contact with the sod bed by tamping or rolling with approved equipment to provide a true and even surface, and ensure knitting without displacement of the sod or deformation of the surfaces of sodded areas. Where the sod may be displaced during sodding operations, the workmen, when replacing it, shall work from ladders or treaded planks to prevent further displacement. Screened soil of good quality shall be used to fill all cracks between sods. The quantity of the fill soil shall not cause smothering of the grass. Where the grades are such that the flow of water will be from paved surfaces across sodded areas, the surface of the soil in the sod after compaction shall be set approximately one inch (25 mm) below the pavement edge. Where the flow will be over the sodded areas and onto the paved surfaces around manholes and inlets, the surface of the soil in the sod after compaction shall be placed flush with pavement edges.

On slopes steeper than one (1) vertical to 2-1/2 horizontal and in v-shaped or flat-bottom ditches or gutters, the sod shall be pegged with wooden pegs not less than 12 inches (300 mm) in length and have a cross-

sectional area of not less than 3/4 sq inch (18 sq mm). The pegs shall be driven flush with the surface of the sod.

904-3.6 Watering. Adequate water and watering equipment must be on hand before sodding begins, and sod shall be kept moist until it has become established and its continued growth assured. In all cases, watering shall be done in a manner that will avoid erosion from the application of excessive quantities and will avoid damage to the finished surface.

904-3.7 Establishing turf. The Contractor shall provide general care for the sodded areas as soon as the sod has been laid and shall continue until final inspection and acceptance of the work. All sodded areas shall be protected against traffic or other use by warning signs or barricades approved by the RPR. The Contractor shall mow the sodded areas with approved mowing equipment, depending upon climatic and growth conditions and the needs for mowing specific areas. Weeds or other undesirable vegetation shall be mowed and the clippings raked and removed from the area.

904-3.8 Repairing. When the surface has become gullied or otherwise damaged during the period covered by this contract, the affected areas shall be repaired to re-establish the grade and the condition of the soil, as directed by the RPR, and shall then be sodded as specified in paragraph 904-3.5.

METHOD OF MEASUREMENT

904-4.1 This item shall be measured on the basis of the area in square yards (square meters) of the surface covered with sod and accepted.

BASIS OF PAYMENT

904-5.1 This item will be paid for on the basis of the contract unit price per square yard (square meter) for sodding, which price shall be full compensation for all labor, equipment, material, staking, and incidentals necessary to satisfactorily complete the items as specified.

Payment will be made under:

~~Item T-904-5.1 Sodding - per square yard (square meter)~~

Item T-904-1 Sodding, Bahia Argentina -per Square Yard (SY)

REFERENCES

905-6.1 The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)
ASTM C602 Standard Specification for Agricultural Liming Materials

Advisory Circulars (AC)
AC 150/5200-33 Hazardous Wildlife Attractants on or Near Airports

FAA/United States Department of Agriculture
Wildlife Hazard Management at Airports, A Manual for Airport Personnel

END OF ITEM T-904

ITEM L-108

UNDERGROUND POWER CABLE FOR AIRPORTS

ITEM L-108 "UNDERGROUND POWER CABLE FOR AIRPORTS" is a technical specification contained in Federal Aviation Administration Advisory Circular – 150/5370-10H, "Standard Specifications for Construction of Airports."

This item has been modified to make allowances for local materials, methods and requirements. This item has been updated and modified to comply with the latest editions of other applicable codes, from knowledge gained on other airport construction projects and valuable lessons learned from airport maintenance staffs.

Deletions are noted by the ~~strikethrough~~ method.

Changes and additions are noted by the ***bold italic*** method.

ITEM L-108 UNDERGROUND POWER CABLE FOR AIRPORTS

DESCRIPTION

108-1.1 This item shall consist of furnishing and installing power cables that are direct buried and furnishing and/or installing power cables within conduit or duct banks per these specifications at the locations shown on the plans. It includes excavation and backfill of trench for direct-buried cables only. Also included are the installation of counterpoise wires, ground wires, ground rods and connections, cable splicing, cable marking, cable testing, and all incidentals necessary to place the cable in operating condition as a completed unit to the satisfaction of the RPR. This item shall not include the installation of duct banks or conduit, trenching and backfilling for duct banks or conduit, or furnishing or installation of cable for FAA owned/operated facilities.

EQUIPMENT AND MATERIALS

108-2.1 GENERAL.

a. Airport lighting equipment and materials covered by advisory circulars (AC) shall be approved under the Airport Lighting Equipment Certification Program per AC 150/5345-53, current version.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification, when requested by the RPR.

c. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

d. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

e. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format. The RPR reserves the right to reject any and all equipment, materials, or procedures that do not meet the system design and the standards and codes, specified in this document.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for at least twelve (12) months from the date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner. The Contractor shall maintain a minimum insulation resistance in accordance with paragraph 108-3.10e with isolation

transformers connected in new circuits and new segments of existing circuits through the end of the contract warranty period when tested in accordance with AC 150/5340-26, *Maintenance Airport Visual Aid Facilities*, paragraph 5.1.3.1, Insulation Resistance Test.

108-2.2 CABLE. Underground cable for airfield lighting facilities (runway and taxiway lights and signs) shall conform to the requirements of AC 150/5345-7, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits latest edition. Conductors for use on 6.6 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #8 American wire gauge (AWG), L-824 Type C, 5,000 volts, non-shielded, with cross-linked polyethylene insulation. Conductors for use on 20 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #6 AWG, L-824 Type C, 5,000 volts, non-shielded, with cross-linked polyethylene insulation. L-824 conductors for use on the L-830 secondary of airfield lighting series circuits shall be sized in accordance with the manufacturer's recommendations. All other conductors shall comply with FAA and National Electric Code (NEC) requirements. Conductor sizes noted above shall not apply to leads furnished by manufacturers on airfield lighting transformers and fixtures.

Wire for electrical circuits up to 600 volts shall comply with Specification L-824 and/or Commercial Item Description A-A-59544A and shall be type THWN-2, 75°C for installation in conduit and RHW-2, 75°C for direct burial installations. Conductors for parallel (voltage) circuits shall be type and size and installed in accordance with NFPA-70, National Electrical Code.

Unless noted otherwise, all 600-volt and less non-airfield lighting conductor sizes are based on a 75°C, THWN-2, 600-volt insulation, copper conductors, not more than three single insulated conductors, in raceway, in free air. The conduit/duct sizes are based on the use of THWN-2, 600-volt insulated conductors. The Contractor shall make the necessary increase in conduit/duct sizes for other types of wire insulation. In no case shall the conduit/duct size be reduced. The minimum power circuit wire size shall be #12 AWG.

Conductor sizes may have been adjusted due to voltage drop or other engineering considerations. Equipment provided by the Contractor shall be capable of accepting the quantity and sizes of conductors shown in the Contract Documents. All conductors, pigtails, cable step-down adapters, cable step-up adapters, terminal blocks and splicing materials necessary to complete the cable termination/splice shall be considered incidental to the respective pay items provided.

Cable type, size, number of conductors, strand and service voltage shall be as specified in the Contract Document.

108-2.3 BARE COPPER WIRE (COUNTERPOISE, BARE COPPER WIRE GROUND AND GROUND RODS). Wire for counterpoise or ground installations for airfield lighting systems shall be No. 2 AWG bare solid copper wire for counterpoise and/or No. 6 AWG insulated stranded for grounding bond wire per ASTM B3 and ASTM B8, and shall be tinned copper wire per ASTM B33. For voltage powered circuits, the equipment grounding conductor shall comply with NEC Article 250.

Ground rods shall be sectional copper-clad steel. The ground rods shall be of the length and diameter specified on the plans, but in no case be less than 10 feet (2.54 m) long and 3/4 inch (19 mm) in diameter.

108-2.4 Cable connections. In-line connections or splices of underground primary cables shall be of the type called for on the plans, and shall be one of the types listed below. No separate payment will be made for cable connections.

a. The cast splice. A cast splice, employing a plastic mold and using epoxy resin equivalent to that manufactured by 3M™ Company, "Scotchcast" Kit No. 82-B, or an approved equivalent, used for potting the splice is acceptable.

b. The field-attached plug-in splice. Field attached plug-in splices shall be installed as shown on the plans. The Contractor shall determine the outside diameter of the cable to be spliced and furnish appropriately sized connector kits and/or adapters. Tape or heat shrink tubing with integral sealant shall be in accordance with the manufacturer's requirements. Primary Connector Kits manufactured by Amerace, "Super Kit", Integro "Complete Kit", or approved equal is acceptable.

c. The factory-molded plug-in splice. Specification for L-823 Connectors, Factory-Molded to Individual Conductors, is acceptable.

d. The taped or heat-shrink splice. Taped splices employing field-applied rubber, or synthetic rubber tape covered with plastic tape is acceptable. The rubber tape should meet the requirements of ASTM D4388 and the plastic tape should comply with Military Specification MIL-I-24391 or Commercial Item Description A-A-55809. Heat shrinkable tubing shall be heavy-wall, self-sealing tubing rated for the voltage of the wire being spliced and suitable for direct-buried installations. The tubing shall be factory coated with a thermoplastic adhesive-sealant that will adhere to the insulation of the wire being spliced forming a moisture- and dirt-proof seal. Additionally, heat shrinkable tubing for multi-conductor cables, shielded cables, and armored cables shall be factory kits that are designed for the application. Heat shrinkable tubing and tubing kits shall be manufactured by Tyco Electronics/ Raychem Corporation, Energy Division, or approved equivalent.

In all the above cases, connections of cable conductors shall be made using crimp connectors using a crimping tool designed to make a complete crimp before the tool can be removed. All L-823/L-824 splices and terminations shall be made per the manufacturer's recommendations and listings.

All connections of counterpoise, grounding conductors and ground rods shall be made by the exothermic process or approved equivalent, except that a light base ground clamp connector shall be used for attachment to the light base. All exothermic connections shall be made per the manufacturer's recommendations and listings.

108-2.5 SPLICER QUALIFICATIONS. Every airfield lighting cable splicer shall be qualified in making airport cable splices and terminations on cables rated at or above 5,000 volts AC. The Contractor shall submit to the RPR proof of the qualifications of each proposed cable splicer for the airport cable type and voltage level to be worked on. Cable splicing/terminating personnel shall have a minimum of three (3) years continuous experience in terminating/splicing medium voltage cable.

108-2.6 CONCRETE. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures.

108-2.7 FLOWABLE BACKFILL. Flowable material used to backfill trenches for power cable trenches shall conform to the requirements of Item P-153, Controlled Low Strength Material.

108-2.8 CABLE IDENTIFICATION TAGS. Cable identification tags shall be made from a non-corrosive material with the circuit identification stamped or etched onto the tag. The tags shall be of the type as detailed on the plans.

108-2.9 TAPE. Electrical tapes shall be Scotch™ Electrical Tapes –Scotch™ 88 (1-1/2 inch (38 mm) wide) and Scotch™ 130C® linerless rubber splicing tape (2-inch (50 mm) wide), as manufactured by the Minnesota Mining and Manufacturing Company (3M™), or an approved equivalent.

108-2.10 ELECTRICAL COATING. Electrical coating shall be Scotchkote™ as manufactured by 3M™, or an approved equivalent.

108-2.11 EXISTING CIRCUITS. Whenever the scope of work requires connection to an existing circuit, the existing circuit's insulation resistance shall be tested, in the presence of the RPR. The test shall be performed per this item and prior to any activity that will affect the respective circuit. The Contractor shall record the results on forms acceptable to the RPR. When the work affecting the circuit is complete, the circuit's insulation resistance shall be checked again, in the presence of the RPR. The Contractor shall record the results on forms acceptable to the RPR. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the existing circuit to bring the second reading above the first reading. All repair costs including a complete replacement of the L-823 connectors, L-830 transformers and L-824 cable, if necessary, shall be borne by the Contractor. All test results shall be submitted in the Operation and Maintenance (O&M) Manual.

108-2.12 DETECTABLE WARNING TAPE. Plastic, detectable, American Public Works Association (APWA) Red (electrical power lines, cables, conduit and lighting cable) with continuous legend tape shall be polyethylene film with a metalized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item. Detectable warning tape for communication cables shall be orange. Detectable warning tape color code shall comply with the APWA Uniform Color Code.

CONSTRUCTION METHODS

108-3.1 GENERAL. The Contractor shall install the specified cable at the approximate locations indicated on the plans. Unless otherwise shown on the plans, all cable required to cross under pavements expected to carry aircraft loads shall be installed in concrete encased duct banks. Cable shall be run without splices, from fixture to fixture.

Cable connections between lights will be permitted only at the light locations for connecting the underground cable to the primary leads of the individual isolation transformers. The Contractor shall be responsible for providing cable in continuous lengths for home runs or other long cable runs without connections unless otherwise authorized in writing by the RPR or shown on the plans.

In addition to connectors being installed at individual isolation transformers, L-823 cable connectors for maintenance and test points shall be installed at locations shown on the plans. Cable circuit identification markers shall be installed on both sides of the L-823 connectors installed and on both sides of slack loops where a future connector would be installed.

Provide not less than 3 feet (1 m) of cable slack on each side of all connections, isolation transformers, light units, and at points where cable is connected to field equipment. Where provisions must be made for testing or for future above grade connections, provide enough slack to allow the cable to be extended at least one foot (30 cm) vertically above the top of the access structure. This requirement also applies where primary cable passes through empty light bases, junction boxes, and access structures to allow for future connections, or as designated by the RPR.

Primary airfield lighting cables installed shall have cable circuit identification markers attached on both sides of each L-823 connector and on each airport lighting cable entering or leaving cable access points, such as manholes, hand holes, pull boxes, junction boxes, etc. Markers shall be of sufficient length for imprinting the cable circuit identification legend on one line, using letters not less than 1/4 inch (6 mm) in size. The cable circuit identification shall match the circuits noted on the construction plans.

108-3.2 INSTALLATION IN DUCT BANKS OR CONDUITS. This item includes the installation of the cable in duct banks or conduit per the following paragraphs. The maximum number and voltage ratings of cables installed in each single duct or conduit, and the current-carrying capacity of each cable shall be per the latest version of the National Electric Code, or the code of the local agency or authority having jurisdiction.

The Contractor shall make no connections or splices of any kind in cables installed in conduits or duct banks.

Unless otherwise designated in the plans, where ducts are in tiers, use the lowest ducts to receive the cable first, with spare ducts left in the upper levels. Check duct routes prior to construction to obtain assurance that the shortest routes are selected and that any potential interference is avoided.

Duct banks or conduits shall be installed as a separate item per Item L-110, Airport Underground Electrical Duct Banks and Conduit. The Contractor shall run a mandrel through duct banks or conduit prior to installation of cable to ensure that the duct bank or conduit is open, continuous and clear of debris. The mandrel size shall be compatible with the conduit size. The Contractor shall swab out all conduits/ducts and clean light bases, manholes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed, the light bases and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, light bases, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be re-cleaned at the Contractor’s expense. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

The cable shall be installed in a manner that prevents harmful stretching of the conductor, damage to the insulation, or damage to the outer protective covering. The ends of all cables shall be sealed with moisture-seal tape providing moisture-tight mechanical protection with minimum bulk, or alternately, heat shrinkable tubing before pulling into the conduit and it shall be left sealed until connections are made. Where more than one cable is to be installed in a conduit, all cable shall be pulled in the conduit at the same time. The pulling of a cable through duct banks or conduits may be accomplished by hand winch or power winch with the use of cable grips or pulling eyes. Maximum pulling tensions shall not exceed the cable manufacturer’s recommendations. A non-hardening cable-pulling lubricant recommended for the type of cable being installed shall be used where required.

The Contractor shall submit the recommended pulling tension values to the RPR prior to any cable installation. If required by the RPR, pulling tension values for cable pulls shall be monitored by a dynamometer in the presence of the RPR. Cable pull tensions shall be recorded by the Contractor and reviewed by the RPR. Cables exceeding the maximum allowable pulling tension values shall be removed and replaced by the Contractor at the Contractor's expense.

The manufacturer's minimum bend radius or NEC requirements (whichever is more restrictive) shall apply. Cable installation, handling and storage shall be per manufacturer's recommendations. During cold weather, particular attention shall be paid to the manufacturer's minimum installation temperature. Cable shall not be installed when the temperature is at or below the manufacturer's minimum installation temperature. At the Contractor's option, the Contractor may submit a plan, for review by the RPR, for heated storage of the cable and maintenance of an acceptable cable temperature during installation when temperatures are below the manufacturer's minimum cable installation temperature.

Cable shall not be dragged across base can or manhole edges, pavement or earth. When cable must be coiled, lay cable out on a canvas tarp or use other appropriate means to prevent abrasion to the cable jacket.

108-3.3 INSTALLATION OF DIRECT-BURIED CABLE IN TRENCHES. Not Required

108-3.4 CABLE MARKERS FOR DIRECT-BURIED CABLE. The location of direct buried circuits shall be marked by a concrete slab marker, 2 feet (60 cm) square and 4-6 inch (10 - 15 cm) thick, extending approximately one inch (25 mm) above the surface. Each cable run from a line of lights and signs to the equipment vault shall be marked at approximately every 200 feet (61 m) along the cable run, with an additional marker at each change of direction of cable run. All other direct-buried cable shall be marked in the same manner. Cable markers shall be installed directly above the cable. The Contractor shall impress the word "CABLE" and directional arrows on each cable marking slab. The letters shall be approximately 4 inches (100 mm) high and 3 inches (75 mm) wide, with width of stroke 1/2 inch (12 mm) and 1/4 inch (6 mm) deep. Stencils shall be used for cable marker lettering; no hand lettering shall be permitted.

At the location of each underground cable connection/splice, except at lighting units, or isolation transformers, a concrete marker slab shall be installed to mark the location of the connection/splice. The Contractor shall impress the word "SPLICE" on each slab. The Contractor also shall impress additional circuit identification symbols on each slab as directed by the RPR. All cable markers and splice markers shall be painted international orange. Paint shall be specifically manufactured for uncured exterior concrete. After placement, all cable or splice markers shall be given one coat of high-visibility aviation orange paint as approved by the RPR. Furnishing and installation of cable markers is incidental to the respective cable pay item.

108-3.5 SPLICING. Connections of the type shown on the plans shall be made by experienced personnel regularly engaged in this type of work and shall be made as follows:

a. Cast splices. These shall be made by using crimp connectors for jointing conductors. Molds shall be assembled, and the compound shall be mixed and poured per the manufacturer's instructions and to the satisfaction of the RPR.

b. Field-attached plug-in splices. These shall be assembled per the manufacturer's instructions. These splices shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1)

wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches (38 mm) on each side of the joint or (3) On connector kits equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

c. Factory-molded plug-in splices. These shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) Wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint. (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches (38 mm) on each side of the joint. or (3) On connector kits so equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

d. Taped or heat-shrink splices. A taped splice shall be made in the following manner:

Bring the cables to their final position and cut so that the conductors will butt. Remove insulation and jacket allowing for bare conductor of proper length to fit compression sleeve connector with 1/4 inch (6 mm) of bare conductor on each side of the connector. Prior to splicing, the two ends of the cable insulation shall be penciled using a tool designed specifically for this purpose and for cable size and type. Do not use emery paper on splicing operation since it contains metallic particles. The copper conductors shall be thoroughly cleaned. Join the conductors by inserting them equidistant into the compression connection sleeve. Crimp conductors firmly in place with crimping tool that requires a complete crimp before tool can be removed. Test the crimped connection by pulling on the cable. Scrape the insulation to assure that the entire surface over which the tape will be applied (plus 3 inches (75 mm) on each end) is clean. After scraping, wipe the entire area with a clean lint-free cloth. Do not use solvents.

Apply high-voltage rubber tape one-half lapped over bare conductor. This tape should be tensioned as recommended by the manufacturer. Voids in the connector area may be eliminated by highly elongating the tape, stretching it just short of its breaking point. The manufacturer's recommendation for stretching tape during splicing shall be followed. Always attempt to exactly half-lap to produce a uniform buildup. Continue buildup to 1-1/2 times cable diameter over the body of the splice with ends tapered a distance of approximately one inch (25 mm) over the original jacket. Cover rubber tape with two layers of vinyl pressure-sensitive tape one-half lapped. Do not use glyptol or lacquer over vinyl tape as they react as solvents to the tape. No further cable covering or splice boxes are required.

Heat shrinkable tubing shall be installed following manufacturer’s instructions. Direct flame heating shall not be permitted unless recommended by the manufacturer. Cable surfaces within the limits of the heat-shrink application shall be clean and free of contaminates prior to application.

e. Assembly. Surfaces of equipment or conductors being terminated or connected shall be prepared in accordance with industry standard practice and manufacturer’s recommendations. All surfaces to be connected shall be thoroughly cleaned to remove all dirt, grease, oxides, nonconductive films, or other foreign material. Paints and other nonconductive coatings shall be removed to expose base metal. Clean all surfaces at least 1/4 inch (6.4 mm) beyond all sides of the larger bonded area on all mating surfaces. Use a joint compound suitable for the materials used in the connection. Repair painted/coated surface to original condition after completing the connection.

108-3.6 BARE COUNTERPOISE WIRE INSTALLATION FOR LIGHTNING PROTECTION AND GROUNDING. If shown on the plans or included in the job specifications, bare solid #2 AWG copper counterpoise wire shall be installed for lightning protection of the underground cables. The RPR shall select one of two methods of lightning protection for the airfield lighting circuit based upon sound engineering practice and lightning strike density.

a. Equipotential. The counterpoise size is as shown on the plans. The equipotential method is applicable to all airfield lighting systems; i.e. runway, taxiway, apron – touchdown zone, centerline, edge, threshold and approach lighting systems. The equipotential method is also successfully applied to provide lightning protection for power, signal and communication systems. The light bases, counterpoise, etc. – all components - are bonded together and bonded to the vault power system ground loop/electrode.

Counterpoise wire shall be installed in the same trench for the entire length of buried cable, conduits and duct banks that are installed to contain airfield cables. The counterpoise is centered over the cable/conduit/duct to be protected.

The counterpoise conductor shall be installed no less than 8 inches (200 mm) minimum or 12 inches (300 mm) maximum above the raceway or cable to be protected, except as permitted below:

(1) The minimum counterpoise conductor height above the raceway or cable to be protected shall be permitted to be adjusted subject to coordination with the airfield lighting and pavement designs.

(2) The counterpoise conductor height above the protected raceway(s) or cable(s) shall be calculated to ensure that the raceway or cable is within a 45-degree area of protection, (45 degrees on each side of vertical creating a 90 degree angle).

The counterpoise conductor shall be bonded to each metallic light base, mounting stake, and metallic airfield lighting component.

All metallic airfield lighting components in the field circuit on the output side of the constant current regulator (CCR) or other power source shall be bonded to the airfield lighting counterpoise system.

All components rise and fall at the same potential; with no potential difference, no damaging arcing and no damaging current flow.

See AC 150/5340-30, Design and Installation Details for Airport Visual Aids and NFPA 780, Standard for the Installation of Lightning Protection Systems, Chapter 11, for a detailed description of the Equipotential Method of lightning protection.

Reference FAA STD-019E, Lightning and Surge Protection, Grounding Bonding and Shielding Requirements for Facilities and Electronic Equipment, Part 4.1.1.7.

b. Isolation. Not used

c. Common Installation requirements. When a metallic light base is used, the grounding electrode shall be bonded to the metallic light base or mounting stake with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

When a nonmetallic light base is used, the grounding electrode shall be bonded to the metallic light fixture or metallic base plate with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

Grounding electrodes may be rods, ground dissipation plates, radials, or other electrodes listed in the NFPA 70 (NEC) or NFPA 780.

Where raceway is installed by the directional bore, jack and bore, or other drilling method, the counterpoise conductor shall be permitted to be installed concurrently with the directional bore, jack and bore, or other drilling method raceway, external to the raceway or sleeve.

The counterpoise wire shall also be exothermically welded to ground rods installed as shown on the plans but not more than 500 feet (150 m) apart around the entire circuit. The counterpoise system shall be continuous and terminate at the transformer vault or at the power source. It shall be securely attached to the vault or equipment external ground ring or other made electrode-grounding system. The connections shall be made as shown on the plans and in the specifications.

Where an existing airfield lighting system is being extended or modified, the new counterpoise conductors shall be interconnected to existing counterpoise conductors at each intersection of the new and existing airfield lighting counterpoise systems.

d. Parallel Voltage Systems. Provide grounding and bonding in accordance with NFPA 70, National Electrical Code.

108-3.7 COUNTERPOISE INSTALLATION ABOVE MULTIPLE CONDUITS AND DUCT BANKS. Counterpoise wires shall be installed above multiple conduits/duct banks for airfield lighting cables, with the intent being to provide a complete area of protection over the airfield lighting cables. When multiple conduits and/or duct banks for airfield cable are installed in the same trench, the number and location of counterpoise wires above the conduits shall be adequate to provide a complete area of protection measured 45 degrees each side of vertical.

Where duct banks pass under pavement to be constructed in the project, the counterpoise shall be placed above the duct bank. Reference details on the construction plans.

108-3.8 COUNTERPOISE INSTALLATION AT EXISTING DUCT BANKS. When airfield lighting cables are indicated on the plans to be routed through existing duct banks, the new counterpoise wiring shall be terminated at ground rods at each end of the existing duct bank where the cables being protected enter and exit the duct bank. The new counterpoise conductor shall be bonded to the existing counterpoise system.

108-3.9 EXOTHERMIC BONDING. Bonding of counterpoise wire shall be by the exothermic welding process or equivalent method accepted by the RPR. Only personnel experienced in and regularly engaged in this type of work shall make these connections.

Contractor shall demonstrate to the satisfaction of the RPR, the welding kits, materials and procedures to be used for welded connections prior to any installations in the field. The installations shall comply with the manufacturer’s recommendations and the following:

a. All slag shall be removed from welds.

b. Using an exothermic weld to bond the counterpoise to a lug on a galvanized light base is not recommended unless the base has been specially modified. Consult the manufacturer's installation directions for proper methods of bonding copper wire to the light base. See AC 150/5340-30 for galvanized light base exception.

c. If called for in the plans, all buried copper and weld material at weld connections shall be thoroughly coated with 6 mm of 3M™ Scotchkote™, or approved equivalent, or coated with coal tar Bitumastic® material to prevent surface exposure to corrosive soil or moisture.

108-3.10 TESTING. The Contractor shall furnish all necessary equipment and appliances for testing the airport electrical systems and underground cable circuits before and after installation. The Contractor shall perform all tests in the presence of the RPR. The Contractor shall demonstrate the electrical characteristics to the satisfaction of the RPR. All costs for testing are incidental to the respective item being tested. For phased projects, the tests must be completed by phase. The Contractor must maintain the test results throughout the entire project as well as during the warranty period that meet the following:

a. Earth resistance testing methods shall be submitted to the RPR for approval. Earth resistance testing results shall be recorded on an approved form and testing shall be performed in the presence of the RPR. All such testing shall be at the sole expense of the Contractor.

b. Should the counterpoise or ground grid conductors be damaged or suspected of being damaged by construction activities the Contractor shall test the conductors for continuity with a low resistance ohmmeter. The conductors shall be isolated such that no parallel path exists and tested for continuity. The RPR shall approve of the test method selected. All such testing shall be at the sole expense of the Contractor.

After installation, the Contractor shall test and demonstrate to the satisfaction of the RPR the following:

c. That all affected lighting power and control circuits (existing and new) are continuous and free from short circuits.

d. That all affected circuits (existing and new) are free from unspecified grounds.

e. That the insulation resistance to ground of all new non-grounded high voltage series circuits or cable segments is not less than 500 megohms. Verify continuity of all series airfield lighting circuits prior to energization.

f. That the insulation resistance to ground of all new non-grounded conductors of new multiple circuits or circuit segments is not less than 100 megohms.

g. That all affected circuits (existing and new) are properly connected per applicable wiring diagrams.

h. That all affected circuits (existing and new) are operable. Tests shall be conducted that include operating each control not less than 10 times and the continuous operation of each lighting and power circuit for not less than 1/2 hour.

i. That the impedance to ground of each ground rod does not exceed 10 ohms prior to establishing connections to other ground electrodes. The fall-of-potential ground impedance test

shall be used, as described by American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81, to verify this requirement. As an alternate, clamp-on style ground impedance test meters may be used to satisfy the impedance testing requirement. Test equipment and its calibration sheets shall be submitted for review and approval by the RPR prior to performing the testing.

Two copies of tabulated results of all cable tests performed shall be supplied by the Contractor to the RPR. Where connecting new cable to existing cable, insulation resistance tests shall be performed on the new cable prior to connection to the existing circuit.

There are no approved “repair” procedures for items that have failed testing other than complete replacement.

METHOD OF MEASUREMENT

108-4.1 The cost of all excavation, backfill, dewatering and restoration regardless of the type of material encountered shall be included in the unit price bid for the work.

108-4.2 Cable or counterpoise wire installed in trench, duct bank or conduit shall be measured by the number of linear feet (meters) installed and grounding connectors, and trench marking tape ready for operation, and accepted as satisfactory. Separate measurement shall be made for each cable or counterpoise wire installed in trench, duct bank or conduit. The measurement for this item shall include additional quantities required for slack.

108-4.3 Ground rods shall be measured by each 10-foot section installed complete.

BASIS OF PAYMENT

108-5.1 Payment will be made at the contract unit price for trenching, cable and bare counterpoise wire installed in trench (direct-buried), or cable and equipment ground installed in duct bank or conduit, in place by the Contractor and accepted by the RPR. This price shall be full compensation for furnishing all materials and for all preparation and installation of these materials, and for all labor, equipment, tools, and incidentals, including ground rods and ground connectors and trench marking tape, necessary to complete this item.

Payment will be made under:

~~Item L-108-5.1 Trenching for direct-buried cable, 18-inch minimum depth - per linear foot (meter)~~

~~Item L-108-5.2 **[** No. 8 AWG **] [** No. 6 AWG **], [** 5 kV **] [** 600V **]**, L-824, **[** Type C **] [** Type B **]** Cable, Installed in Trench, Duct Bank or Conduit - per liner foot (meter)~~

~~Item L-108-5.3 No. **[** 6 **] [** 4 **] [** 2 **]** AWG, Solid, Bare Copper Counterpoise Wire, Installed **[** in Trench **], [** Above the Duct Bank or Conduit **]**, Including Connections/Terminations - per linear foot (meter)~~

~~Item L-108-5.4 No. **[** 6 **] [** 4 **] [** 2 **]** AWG, **[** Bare **] [** Insulated **]**, Stranded Equipment **[** bonding **] [** Ground **]**, Installed in Duct Bank or Conduit - per linear foot (meter).~~

Item L-108-1	1/C L-824-Type C Unshielded #8 AWG 5 KV Stranded Copper Cable, Installed in Duct or Conduit	-- per Linear Foot (LF)
Item L-108-2	1/C #2 AWG Solid Copper Counterpoise Cable, Installed over Duct or Conduit	-- per Linear Foot (LF)
Item L-108-3	0.75" Diameter by 10.00' Long Copper Clad Steel Sectional Ground Rod	-- per Each (EA)

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5340-26	Maintenance of Airport Visual Aid Facilities
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-53	Airport Lighting Equipment Certification Program

Commercial Item Description

A-A-59544A	Cable and Wire, Electrical (Power, Fixed Installation)
A-A-55809	Insulation Tape, Electrical, Pressure-Sensitive Adhesive, Plastic

ASTM International (ASTM)

ASTM B3	Standard Specification for Soft or Annealed Copper Wire
ASTM B8	Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B33	Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes
ASTM D4388	Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes

Mil Spec

MIL-PRF-23586F	Performance Specification: Sealing Compound (with Accelerator), Silicone Rubber, Electrical
MIL-I-24391	Insulation Tape, Electrical, Plastic, Pressure Sensitive

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)
NFPA-780	Standard for the Installation of Lightning Protection Systems

American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)

ANSI/IEEE STD 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

Federal Aviation Administration Standard

FAA STD-019E	Lightning and Surge Protection, Grounding Bonding and Shielding Requirements for Facilities and Electronic Equipment

END OF ITEM L-108

ITEM L-110

AIRPORT UNDERGROUND ELECTRICAL DUCT BANKS AND CONDUITS

ITEM L-110 "AIRPORT UNDERGROUND ELECTRICAL DUCT BANKS AND CONDUITS" is a technical specification contained in Federal Aviation Administration Advisory Circular – 150/5370-10H, "Standard Specifications for Construction of Airports."

This item has been modified to make allowances for local materials, methods and requirements. This item has been updated and modified to comply with the latest editions of other applicable codes, from knowledge gained on other airport construction projects and valuable lessons learned from airport maintenance staffs.

Deletions are noted by the ~~strikethrough~~ method.

Changes and additions are noted by the ***bold italic*** method.

ITEM L-110 AIRPORT UNDERGROUND ELECTRICAL DUCT BANKS AND CONDUITS

DESCRIPTION

110-1.1 This item shall consist of underground electrical conduits and duct banks (single or multiple conduits encased in concrete or buried in sand) installed per this specification at the locations and per the dimensions, designs, and details shown on the plans. This item shall include furnishing and installing of all underground electrical duct banks and individual and multiple underground conduits. It shall also include all turfing trenching, backfilling, removal, and restoration of any paved or turfed areas; concrete encasement, mandrelling, pulling lines, duct markers, plugging of conduits, and the testing of the installation as a completed system ready for installation of cables per the plans and specifications. This item shall also include furnishing and installing conduits and all incidentals for providing positive drainage of the system. Verification of existing ducts is incidental to the pay items provided in this specification.

EQUIPMENT AND MATERIALS

110-2.1 GENERAL.

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the RPR.

b. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications and acceptable to the RPR. Materials supplied and/or installed that do not comply with these specifications shall be removed, when directed by the RPR and replaced with materials, that comply with these specifications, at the Contractor's cost.

c. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in project that accrue directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes specified in this document.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

110-2.2 STEEL CONDUIT. Rigid galvanized steel (RGS) conduit and fittings shall be hot dipped galvanized inside and out and conform to the requirements of Underwriters Laboratories Standards 6, 514B, and 1242. All RGS conduits or RGS elbows installed below grade, in concrete, permanently wet locations or other similar environments shall be painted with a 10-mil thick coat of asphaltum sealer or shall have a factory-bonded polyvinyl chloride (PVC) cover. Any exposed galvanizing or steel shall be coated with 10 mils of asphaltum sealer. When using PVC coated RGS conduit, care shall be exercised not to damage the factory PVC coating. Damaged PVC coating shall be repaired per the manufacturer's written instructions. In lieu of PVC coated RGS, corrosion wrap tape shall be permitted to be used where RGS is in contact with direct earth."

110-2.3 PLASTIC CONDUIT. Plastic conduit and fittings-shall conform to the following requirements:

- UL 514B covers W-C-1094-Conduit fittings all types, classes 1 thru 3 and 6 thru 10.
- UL 514C covers W-C-1094- all types, Class 5 junction box and cover in plastic (PVC).
- UL 651 covers W-C-1094-Rigid PVC Conduit, types I and II, Class 4.
- UL 651A covers W-C-1094-Rigid PVC Conduit and high-density polyethylene (HDPE) Conduit type III and Class 4.

Underwriters Laboratories Standards UL-651 and Article 352 of the current National Electrical Code shall be one of the following, as shown on the plans:

a. Type I–Schedule 40 and Schedule 80 PVC suitable for underground use either direct-buried or encased in concrete.

b. Type II–Schedule 40 PVC suitable for either above ground or underground use.

c. Type III – Schedule 80 PVC suitable for either above ground or underground use either direct-buried or encased in concrete.

d. Type III –HDPE pipe, minimum standard dimensional ratio (SDR) 11, suitable for placement with directional boring under pavement.

The type of solvent cement shall be as recommended by the conduit/fitting manufacturer.

110-2.4 SPLIT CONDUIT. Split conduit shall be pre-manufactured for the intended purpose and shall be made of steel or plastic.

110-2.5 CONDUIT SPACERS. Conduit spacers shall be prefabricated interlocking units manufactured for the intended purpose. They shall be of double wall construction made of high grade, high density polyethylene complete with interlocking cap and base pads. They shall be designed to accept No. 4 reinforcing bars installed vertically.

110-2.6 CONCRETE. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures.

110-2.7 PRECAST CONCRETE STRUCTURES. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another

RPR approved third party certification program. Precast concrete structures shall conform to ASTM C478.

110-2.8 FLOWABLE BACKFILL. Flowable material used to back fill conduit and duct bank trenches shall conform to the requirements of Item P-153, Controlled Low Strength Material.

110-2.9 DETECTABLE WARNING TAPE. Plastic, detectable, American Public Works Association (APWA) red (electrical power lines, cables, conduit and lighting cable), orange (telephone/fiber optic cabling) with continuous legend magnetic tape shall be polyethylene film with a metallized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item.

CONSTRUCTION METHODS

110-3.1 GENERAL. The Contractor shall install underground duct banks and conduits at the approximate locations indicated on the plans. The RPR shall indicate specific locations as the work progresses, if required to differ from the plans. Duct banks and conduits shall be of the size, material, and type indicated on the plans or specifications. Where no size is indicated on the plans or in the specifications, conduits shall be not less than 2 inches (50 mm) inside diameter or comply with the National Electrical Code based on cable to be installed, whichever is larger. All duct bank and conduit lines shall be laid so as to grade toward access points and duct or conduit ends for drainage. Unless shown otherwise on the plans, grades shall be at least 3 inches (75 mm) per 100 feet (30 m). On runs where it is not practicable to maintain the grade all one way, the duct bank and conduit lines shall be graded from the center in both directions toward access points or conduit ends, with a drain into the storm drainage system. Pockets or traps where moisture may accumulate shall be avoided. Under pavement, the top of the duct bank shall not be less than 18 inches (0.5 m) below the subgrade; in other locations, the top of the duct bank or underground conduit shall be not less than 18 inches (0.5 m) below finished grade.

The Contractor shall mandrel each individual conduit whether the conduit is direct-buried or part of a duct bank. An iron-shod mandrel, not more than 1/4 inch (6 mm) smaller than the bore of the conduit shall be pulled or pushed through each conduit. The mandrel shall have a leather or rubber gasket slightly larger than the conduit hole.

The Contractor shall swab out all conduits/ducts and clean base can, manhole, pull boxes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed the light bases, manholes, pull boxes, etc., and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, base cans, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be recleaned at the Contractor's expense. All accessible points shall be kept closed when not installing cable. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

For pulling the permanent wiring, each individual conduit, whether the conduit is direct-buried or part of a duct bank, shall be provided with a 200-pound (90 kg) test polypropylene pull rope. The ends shall be secured and sufficient length shall be left in access points to prevent it from slipping back into the conduit. Where spare conduits are installed, as indicated on the plans, the open ends shall be plugged with removable tapered plugs, designed for this purpose.

All conduits shall be securely fastened in place during construction and shall be plugged to prevent contaminants from entering the conduits. Any conduit section having a defective joint

shall not be installed. Ducts shall be supported and spaced apart using approved spacers at intervals not to exceed 5 feet (1.5 m).

Unless otherwise shown on the plans, concrete encased duct banks shall be used when crossing under pavements expected to carry aircraft loads, such as runways, taxiways, taxilanes, ramps and aprons. When under paved shoulders and other paved areas, conduit and duct banks shall be encased using flowable fill for protection.

All conduits within concrete encasement of the duct banks shall terminate with female ends for ease in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored.

Trenches for conduits and duct banks may be excavated manually or with mechanical trenching equipment unless in pavement, in which case they shall be excavated with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of shoulder surface is disturbed. Blades of graders shall not be used to excavate the trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches (75 mm) below the required conduit or duct bank depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. Flowable backfill may alternatively be used

Underground electrical warning (Caution) tape shall be installed in the trench above all underground duct banks and conduits in unpaved areas. Contractor shall submit a sample of the proposed warning tape for approval by the RPR. If not shown on the plans, the warning tape shall be located 6 inches above the duct/conduit or the counterpoise wire if present.

Joints in plastic conduit shall be prepared per the manufacturer’s recommendations for the particular type of conduit. Plastic conduit shall be prepared by application of a plastic cleaner and brushing a plastic solvent on the outside of the conduit ends and on the inside of the couplings. The conduit fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly. Where more than one conduit is placed in a single trench, or in duct banks, joints in the conduit shall be staggered a minimum of 2 feet (60 cm).

Changes in direction of runs exceeding 10 degrees, either vertical or horizontal, shall be accomplished using manufactured sweep bends.

Whether or not specifically indicated on the drawings, where the soil encountered at established duct bank grade is an unsuitable material, as determined by the RPR, the unsuitable material shall be removed per Item P-152 and replaced with suitable material. Additional duct bank supports shall be installed, as approved by the RPR.

All excavation shall be unclassified and shall be considered incidental to Item L-110. Dewatering necessary for duct installation, and erosion per federal, state, and local requirements is incidental to Item L-110.

Unless otherwise specified, excavated materials that are deemed by the RPR to be unsuitable for use in backfill or embankments shall be removed and disposed of offsite.

Any excess excavation shall be filled with suitable material approved by the RPR and compacted per Item P-152.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables) cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

a. Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred

b. Trenching, etc., in cable areas shall then proceed with approval of the RPR, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair.

110-3.2 DUCT BANKS. Unless otherwise shown in the plans, duct banks shall be installed so that the top of the concrete envelope is not less than 18 inches (0.5 m) below the bottom of the base or stabilized base course layers where installed under runways, taxiways, aprons, or other paved areas, and not less than 18 inches (0.5 m) below finished grade where installed in unpaved areas.

Unless otherwise shown on the plans, duct banks under paved areas shall extend at least 3 feet (1 m) beyond the edges of the pavement or 3 feet (1 m) beyond any under drains that may be installed alongside the paved area. Trenches for duct banks shall be opened the complete length before concrete is placed so that if any obstructions are encountered, provisions can be made to avoid them. Unless otherwise shown on the plans, all duct banks shall be placed on a layer of concrete not less than 3 inches (75 mm) thick prior to its initial set. The Contractor shall space the conduits not less than 3 inches (75 mm) apart (measured from outside wall to outside wall). All such multiple conduits shall be placed using conduit spacers applicable to the type of conduit. As the conduit laying progresses, concrete shall be placed around and on top of the conduits not less than 3 inches (75 mm) thick unless otherwise shown on the plans. All conduits shall terminate with female ends for ease of access in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Conduits forming the duct bank shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches (150 mm) to anchor the assembly into the earth prior to placing the concrete encasement. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (1.5-m) intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the RPR for review prior to use.

When specified, the Contractor shall reinforce the bottom side and top of encasements with steel reinforcing mesh or fabric or other approved metal reinforcement. When directed, the Contractor shall supply additional supports where the ground is soft and boggy, where ducts cross under roadways, or where shown on the plans. Under such conditions, the complete duct structure shall be supported on reinforced concrete footings, piers, or piles located at approximately 5-foot (1.5-m) intervals.

All pavement surfaces that are to have ducts installed therein shall be neatly saw cut to form a vertical face. All excavation shall be included in the contract with price for the duct.

Install a plastic, detectable, color as noted, 3 to 6 inches (75 to 150 mm) wide tape, 8 inches (200 mm) minimum below grade above all underground conduit or duct lines not installed under pavement. Utilize the 3-inch (75-mm) wide tape only for single conduit runs. Utilize the 6-inch (150-mm) wide tape for multiple conduits and duct banks. For duct banks equal to or greater than 24 inches (600 mm) in width, utilize more than one tape for sufficient coverage and identification of the duct bank as required.

When existing cables are to be placed in split duct, encased in concrete, the cable shall be carefully located and exposed by hand tools. Prior to being placed in duct, the RPR shall be notified so that he may inspect the cable and determine that it is in good condition. Where required, split duct shall be installed as shown on the drawings or as required by the RPR.

110-3.3 CONDUITS WITHOUT CONCRETE ENCASEMENT. Trenches for single-conduit lines shall be not less than 6 inches (150 mm) nor more than 12 inches (300 mm) wide. The trench for 2 or more conduits installed at the same level shall be proportionately wider. Trench bottoms for conduits without concrete encasement shall be made to conform accurately to grade so as to provide uniform support for the conduit along its entire length.

Unless otherwise shown on the plans, a layer of fine earth material, at least 4 inches (100 mm) thick (loose measurement) shall be placed in the bottom of the trench as bedding for the conduit. The bedding material shall consist of soft dirt, sand or other fine fill, and it shall contain no particles that would be retained on a 1/4-inch (6.3 mm) sieve. The bedding material shall be tamped until firm. Flowable backfill may alternatively be used.

Unless otherwise shown on plans, conduits shall be installed so that the tops of all conduits within the Airport's secured area where trespassing is prohibited are at least 18 inches (0.5 m) below the finished grade. Conduits outside the Airport's secured area shall be installed so that the tops of the conduits are at least 24 inches (60 cm) below the finished grade per National Electric Code (NEC), Table 300.5.

When two or more individual conduits intended to carry conductors of equivalent voltage insulation rating are installed in the same trench without concrete encasement, they shall be spaced not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches (150 mm) apart in a vertical direction. Where two or more individual conduits intended to carry conductors of differing voltage insulation rating are installed in the same trench without concrete encasement, they shall be placed not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and lot less than 6 inches (150 mm) apart in a vertical direction.

Trenches shall be opened the complete length between normal termination points before conduit is installed so that if any unforeseen obstructions are encountered, proper provisions can be made to avoid them.

Conduits shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches (150 mm) to anchor the assembly into the earth while backfilling. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (1.5-m) intervals. Spacers shall be in the

proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the RPR for review prior to use.

110-3.4 MARKERS. The location of each end and of each change of direction of conduits and duct banks shall be marked by a concrete slab marker 2 feet (60 cm) square and 4 - 6 inches (100 - 150 mm) thick extending approximately one inch (25 mm) above the surface. The markers shall also be located directly above the ends of all conduits or duct banks, except where they terminate in a junction/access structure or building. Each cable or duct run from a line of lights and signs to the equipment vault must be marked at approximately every 200 feet (61 m) along the cable or duct run, with an additional marker at each change of direction of cable or duct run.

The Contractor shall impress the word “DUCT” or “CONDUIT” on each marker slab. Impression of letters shall be done in a manner, approved by the RPR, for a neat, professional appearance. All letters and words must be neatly stenciled. After placement, all markers shall be given one coat of high-visibility orange paint, as approved by the RPR. The Contractor shall also impress on the slab the number and size of conduits beneath the marker along with all other necessary information as determined by the RPR. The letters shall be 4 inches (100 mm) high and 3 inches (75 mm) wide with width of stroke 1/2 inch (12 mm) and 1/4 inch (6 mm) deep or as large as the available space permits. Furnishing and installation of duct markers is incidental to the respective duct pay item.

110-3.5 BACKFILLING FOR CONDUITS. For conduits, 8 inches (200 mm) of sand, soft earth, or other fine fill (loose measurement) shall be placed around the conduits ducts and carefully tamped around and over them with hand tampers. The remaining trench shall then be backfilled and compacted per Item P-152 except that material used for back fill shall be select material not larger than 4 inches (100 mm) in diameter.

Flowable backfill may alternatively be used.

Trenches shall not contain pools of water during back filling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

110-3.6 BACKFILLING FOR DUCT BANKS. After the concrete has cured, the remaining trench shall be backfilled and compacted per Item P-152 “Excavation and Embankment” except that the material used for backfill shall be select material not larger than 4 inches (100 mm) in diameter. In addition to the requirements of Item P-152, where duct banks are installed under pavement, one moisture/density test per lift shall be made for each 250 linear feet (76 m) of duct bank or one work period’s construction, whichever is less.

Flowable backfill may alternatively be used.

Trenches shall not contain pools of water during backfilling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

110-3.7 RESTORATION. Where sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by the work shall be restored to its original condition. The restoration shall include sodding shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. All restoration shall be considered incidental to the respective L-110 pay item. Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD), and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

110-3.8 OWNERSHIP OF REMOVED CABLE. Removed cable shall be the property of the Contractor and shall be properly disposed of and removed from the project site.

METHOD OF MEASUREMENT

110-4.1 Underground conduits and duct banks shall be measured by the linear feet (meter) of conduits and duct banks installed, including encasement, locator tape, trenching and backfill with designated material, and restoration, and for drain lines, the termination at the drainage structure, all measured in place, completed, and accepted. Separate measurement shall be made for the various types and sizes.

BASIS OF PAYMENT

110-5.1 Payment will be made at the contract unit price per linear foot for each type and size of conduit and duct bank completed and accepted, including trench and backfill with the designated material, and, for drain lines, the termination at the drainage structure. This price shall be full compensation for removal and disposal of existing duct banks and conduits as shown on the plans, furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item per the provisions and intent of the plans and specifications.

Payment will be made under:

~~Item L-110-5.1 **[** Concrete Encased **] [** Non-Encased **]** Electrical Duct Bank, **[** # and Size **]** - per linear foot (meter)~~

~~Item L-110-5.2 **[** Concrete Encased **] [** Non-Encased **]** Electrical Conduit, **[** # and Size **]** - per linear foot (meter)~~

Item L-110-1 1 Way 2" Schedule 40 PVC Direct Earth Buried Duct - per Linear Foot (LF)

Item L-110-2	1 Way 2" Schedule 40 PVC Concrete Encased Duct	- per Linear Foot (LF)
Item L-110-3	1 Way 4” Split Duct	- per Linear Foot (LF)

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circular (AC)

AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-53	Airport Lighting Equipment Certification Program

ASTM International (ASTM)

ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)

Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit - Steel
UL Standard 514B	Conduit, Tubing, and Cable Fittings
UL Standard 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 1242	Electrical Intermediate Metal Conduit Steel
UL Standard 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit

END OF ITEM L-110

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ITEM L-125

INSTALLATION OF AIRPORT LIGHTING SYSTEMS

ITEM L-125 "INSTALLATION OF AIRPORT LIGHTING SYSTEMS" is a technical specification contained in Federal Aviation Administration Advisory Circular – 150/5370-10H, "Standard Specifications for Construction of Airports."

This item has been modified to make allowances for local materials, methods and requirements. This item has been updated and modified to comply with the latest editions of other applicable codes, from knowledge gained on other airport construction projects and valuable lessons learned from airport maintenance staffs.

Deletions are noted by the ~~strikethrough~~ method.

Changes and additions are noted by the ***bold italic*** method.

ITEM L-125 INSTALLATION OF AIRPORT LIGHTING SYSTEMS

DESCRIPTION

125-1.1 This item shall consist of airport lighting systems furnished and installed in accordance with this specification, the referenced specifications, and the applicable advisory circulars (ACs). The systems shall be installed at the locations and in accordance with the dimensions, design, and details shown in the plans. This item shall include the furnishing of all equipment, materials, services, and incidentals necessary to place the systems in operation as completed units to the satisfaction of the RPR.

EQUIPMENT AND MATERIALS

125-2.1 GENERAL.

a. Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall be certified under the Airport Lighting Equipment Certification Program in accordance with AC 150/5345-53, current version. FAA certified airfield lighting shall be compatible with each other to perform in compliance with FAA criteria and the intended operation. If the Contractor provides equipment that does not performs as intended because of incompatibility with the system, the Contractor assumes all costs to correct the system for to operate properly.

b. Manufacturer's certifications shall not relieve the Contractor of their responsibility to provide materials in accordance with these specifications and acceptable to the RPR. Materials supplied and/or installed that do not comply with these specifications shall be removed, when directed by the RPR and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

c. All materials and equipment used shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Clearly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be clearly made with arrows or circles (highlighting is not acceptable). The Contractor shall be responsible for delays in the project accruing directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be submitted in electronic PDF format, tabbed by specification section. The RPR reserves the right to reject any or all equipment, materials or procedures, which, in the RPR’s opinion, does not meet the system design and the standards and codes, specified herein.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

EQUIPMENT AND MATERIALS

125-2.2 CONDUIT/DUCT. Conduit shall conform to Specification Item L-110 Airport Underground Electrical Duct Banks and Conduits.

125-2.3 CABLE AND COUNTERPOISE. Cable and Counterpoise shall conform to Item L-108 Underground Power Cable for Airports.

125-2.4 TAPE. Rubber and plastic electrical tapes shall be Scotch Electrical Tape Numbers 23 and 88 respectively, as manufactured by 3M Company or an approved equal.

125-2.5 CABLE CONNECTIONS. Cable Connections shall conform to Item L-108 Installation of Underground Cable for Airports.

125-2.6 RETROREFLECTIVE MARKERS. Not required.

125-2.7 RUNWAY AND TAXIWAY LIGHTS. Runway and taxiway lights shall conform to the requirements of AC 150/5345-46. Lamps shall be of size and type indicated, or as required by fixture manufacturer for each lighting fixture required under this contract. Filters shall be of colors conforming to the specification for the light concerned or to the standard referenced.

Lights

Type	Class	Mode	Style	Option	Base	Filter	Transformer	Notes
L-861T(L)	2	1			L-867B/D	BI-BLUE	L-830	14” MAX

125-2.8 RUNWAY AND TAXIWAY SIGNS. Runway and Taxiway Guidance Signs should conform to the requirements of AC 150/5345-44.

Signs

Type	Size	Style	Class	Mode	Notes
L-858Y,R, L(L)	2	***5***	1	2	

125-2.9 RUNWAY END IDENTIFIER LIGHT (REIL). Not required.

125-2.10 PRECISION APPROACH PATH INDICATOR (PAPI). Not required.

125-2.11 CIRCUIT SELECTOR CABINET. Not required.

125-2.12 LIGHT BASE AND TRANSFORMER HOUSINGS. Light Base and Transformer Housings should conform to the requirements of AC 150/5345-42. Light bases shall be Type L-867, Class 1A, Size B and D shall be provided as indicated or as required to accommodate the fixture or device installed thereon. Base plates, cover plates, and adapter plates shall be provided to accommodate various sizes of fixtures.

125-2.13 ISOLATION TRANSFORMERS. Isolation Transformers shall be Type L-830, size as required for each installation. Transformer shall conform to AC 150/5345-47.

INSTALLATION

125-3.1 INSTALLATION. The Contractor shall furnish, install, connect and test all equipment, accessories, conduit, cables, wires, buses, grounds and support items necessary to ensure a complete and operable airport lighting system as specified here and shown in the plans.

The equipment installation and mounting shall comply with the requirements of the National Electrical Code and state and local code agencies having jurisdiction.

The Contractor shall install the specified equipment in accordance with the applicable advisory circulars and the details shown on the plans.

125-3.2 TESTING. All lights shall be fully tested by continuous operation for not less than 24 hours as a completed system prior to acceptance. The test shall include operating the constant current regulator in each step not less than 10 times at the beginning and end of the 24-hour test. The fixtures shall illuminate properly during each portion of the test.

125-3.3 SHIPPING AND STORAGE. Equipment shall be shipped in suitable packing material to prevent damage during shipping. Store and maintain equipment and materials in areas protected from weather and physical damage. Any equipment and materials, in the opinion of the RPR, damaged during construction or storage shall be replaced by the Contractor at no additional cost to the owner. Painted or galvanized surfaces that are damaged shall be repaired in accordance with the manufacturer's recommendations.

125-3.4 ELEVATED AND IN-PAVEMENT LIGHTS. Water, debris, and other foreign substances shall be removed prior to installing fixture base and light.

A jig or holding device shall be used when installing each light fixture to ensure positioning to the proper elevation, alignment, level control, and azimuth control. Light fixtures shall be oriented with the light beams parallel to the runway or taxiway centerline and facing in the required direction. The outermost edge of fixture shall be level with the surrounding pavement. Surplus sealant or flexible embedding material shall be removed. The holding device shall remain in place until sealant has reached its initial set.

METHOD OF MEASUREMENT

125-4.1 Reflective markers will be measured by the number installed as completed units in place, ready for operation, and accepted by the RPR. Runway and taxiway lights will be measured by the number of each type installed as completed units in place, ready for operation, and accepted by the RPR. Guidance signs will be measured by the number of each type and size installed as completed units, in place, ready for operation, and accepted by the RPR. Runway End Identifier Lights shall be measured by each system installed as a completed unit in place, ready for operation, and accepted by the RPR.

Precision Approach Path Indicator shall be measured by each system installed as a completed unit, in place, ready for operation, and accepted by the RPR. Abbreviated Precision Approach Path Indicator shall be measured by each system installed as a completed unit, in place, ready for operation, and accepted by the RPR.

BASIS OF PAYMENT

125-5.1 Payment will be made at the Contract unit price for each complete runway or taxiway light, guidance sign, reflective marker, runway end identification light, precision approach path indicator, or abbreviated precision approach path indicator installed by the Contractor and accepted by the RPR. This payment will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools and incidentals necessary to complete this item.

Payment will be made under:

Pay Item	Description	
Item L-125-1	**L-858(L) Sign – Single/Double Face, Led, Size 2 - 2 Module** L-858(L), Y,R,L sign, size 2 with LED installed on a concrete base with a L-867D 24" deep light base, with 1/2" thick galvanized steel cover plate and gasket, properly sized L-830 transformer(s), L-823 connectors, and all incidentals. Align and level as required.	**-- per Each (EA)**
Item L-125-2	**L-858(L) Sign – Single/Double Face, Led, Size 2 - 4 Module** L-858(L) Y,R,L sign, size 2 with LED installed on a concrete base with a L-867D 24" deep light base, with 1/2" thick galvanized steel cover plate and gasket, properly sized L-830 transformer(s), L-823 connectors, and all incidentals. Align and level as required.	**-- per Each (EA)**
Item L-125-3	**L-861T(L) Omnidirectional, Blue, LED, Taxiway Edge Light** L-861T(L), Omni-directional, blue, LED, MITL T/W edge light, column mounted on a L-867B/D deep light base with a "corten" or accepted equivalent base plate with gasket and properly sized L-830 transformer, L-823 connectors, and all incidentals. Align and level as required. The overall height shall be 14".	**-- per Each (EA)**

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5340-18	Standards for Airport Sign Systems
AC 150/5340-26	Maintenance of Airport Visual Aid Facilities
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-5	Circuit Selector Switch

AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-28	Precision Approach Path Indicator (PAPI) Systems
AC 150/5345-39	Specification for L-853, Runway and Taxiway Retroreflective Markers
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories
AC 150/5345-44	Specification for Runway and Taxiway Signs
AC 150/5345-46	Specification for Runway and Taxiway Light Fixtures
AC 150/5345-47	Specification for Series to Series Isolation Transformers for Airport Lighting Systems
AC 150/5345-51	Specification for Discharge-Type Flashing Light Equipment
AC 150/5345-53	Airport Lighting Equipment Certification Program

Engineering Brief (EB)

EB No. 67	Light Sources Other than Incandescent and Xenon for Airport and Obstruction Lighting Fixtures

END OF ITEM L-125

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ITEM SP-100 GENERAL PROVISIONS AND REQUIREMENTS FOR ELECTRICAL WORK

GENERAL

100-1.1 SPECIAL REQUIREMENTS FOR ELECTRICAL WORK.

a. This item shall apply to all electrical work contained within the Contract Documents. Where the contract general conditions, special provisions or other parts of the Contract Documents also apply, the stricter of the documents shall govern.

100-1.2 AUXILIARIES AND ACCESSORIES.

a. Include all auxiliaries and accessories for a complete, fully functional and properly operating system in accordance with the Contract Documents.

b. Provide and install all electrical systems and any necessary appurtenances as per Federal Aviation Administration (FAA) Advisory Circulars and FAA Orders, NFPA 70 - National Electrical Code (NEC), federal, state and local codes whether specified or shown in the Contract Documents or not. The content of the Contract Documents in general only refers to work required above and beyond the requirements of the FAA, NEC and applicable federal, state and local codes.

100-1.3 PROJECT PAY ITEMS.

a. The project pay items are provided to be inclusive of all work to be performed as shown in the Contract Documents. All work not identified with a specific pay item shall be considered required work to complete the project and shall be considered subsidiary to the cost of the project pay items provided.

100-1.4 CONTRACTOR EXPERIENCE.

a. All Contractors used to perform work of this contract shall be licensed to perform electrical work in the state in which the project is located at the time bids are submitted. At least one member (qualifier) of the electrical contracting firm shall hold a state certified (unlimited, unrestricted) electrical contractor’s license.

100-1.5 EXPERIENCE AND SUPERVISION OF CONTRACTOR PERSONNEL.

a. Provide a resident on-site electrical supervisor to manage work at the job site whenever electrical work is being performed or affected. Electrical work is defined as any work described, included, depicted or contained within the Construction Specifications Institute (CSI) Division 16, 26, 27, 28, 33 or 34 specifications, SP-XXX specification series, E- series drawings, and all other work within the Contract Documents dealing with the distribution of electrical power/light, electrical/electronic/light monitoring, communication and control.

b. When work is being performed within the Aircraft Operations Area, the on-site supervisor shall also be within the Aircraft Operations Area, except for incidental absences. Incidental absences shall not exceed 45 minutes in length. The Contractor is encouraged to keep the same on-site supervisor(s) from commencement to completion of work.

c. Each on-site supervisor shall have a minimum of 5 years (2,000 hours per year) of successful supervisory experience either constructing or maintaining airfield lighting systems. At least 3 of these years of experience shall have occurred in the last 5 years on projects of comparable size and complexity. On-site supervisor shall be certified as a "Qualified Person". The definition of a Qualified Person is defined in OSHA 1910.399 and NFPA 70E (Article 100 & 110.2(1)). The certification shall be signed by the Contractor's Electrical License qualifier. Equivalent experience and training may be considered by the Engineer. On-Site supervisor may substitute one year of education in qualified electrical curriculum for one-half year electrical experience for a maximum of 2,000 hours of the required 10,000 hours of experience. Records of on-site supervisor's experience demonstrating compliance with these requirements shall be submitted to the Engineer for verification and review prior to starting work. Experience records shall include contact information for references (name, title and phone number) from airports where the proposed on-site supervisor has completed the required electrical experience. Only on-site supervisors whose experience records have been confirmed by the Engineer shall supervise work. Work shall not start prior to approval of the on-site supervisor, unless under the direct supervision of the Contractor's Electrical License qualifier. Multiple certified on-site supervisors may be required to support multiple shifts or around the clock activities.

d. If at any time the Resident Project Representative (RPR) believes that work is being performed without the presence of an on-site supervisor, the RPR will request that the workman in question demonstrate that the on-site supervisor is present. If the on-site supervisor's presence cannot be verified within 45 minutes the RPR may direct the Contractor to suspend work until proper supervision is made available. The Contractor shall not be remunerated for costs associated with suspension of work under these conditions.

e. It is agreed and understood that, if requested in writing by the RPR, the Contractor shall replace any on-site supervisor with another meeting the required qualifications within seven (7) days of receipt of request.

f. Electricians are tasked with installing raceways and fittings; electrical distribution and supply equipment, pulling, splicing and terminating wire/cable; grounding, lightning protection, installing light bases, light fixtures; connecting signs; performing electrical testing or other work contained in the Contract Documents or as described in 1.5(A) above. Electricians performing work shall have a minimum of 4 years (2,000 hours per year) of successful experience either constructing or maintaining airfield lighting systems and shall be certified a "Qualified Person". A copy of each Electrician's experience shall be submitted to the RPR. Each electrician's experience submittal shall comply with the above requirements. An apprentice/helper/laborer may assist the electrician with the above tasks as directed by the on-site supervisor. An electrician may supervise a maximum of four apprentices/helpers/laborers.

g. Electrical apprentices, helpers, laborers, shall be qualified persons for the work they are performing and shall be under the supervision of the on-site supervisor or electrician.

h. Other helpers, laborers, equipment operators, concrete workers and other crafts persons (skilled or unskilled) shall be qualified persons for the work they are performing and shall be

under the supervision of the on-site supervisor and are not subject to the four person limitation in 1.5.f.

i. Any person who does not have the required experience or who demonstrates a lack of knowledge appropriate for the task they are performing shall be dismissed from the project for remainder of the contract.

SUMMARY OF WORK

100-2.1 GENERAL.

a. In support of this project this contract includes installation of airfield lighting, counterpoise, signage, power distribution, standby generator, lightning protection and other electrical work as shown in the Contract Documents. The above is not intended to be all inclusive but is provided as an aid to the Contractor. It is the intent of the Contract Documents that the Contractor is to furnish and install all materials and provide the necessary supervision, transportation, preparation, assembly, survey and installation of these materials, and for all labor, equipment, tools, incidentals, and appurtenances necessary to provide a fully functional and operational system as described by these Contract Documents. All items are new and unused unless specifically noted otherwise.

100-2.2 RECORD DOCUMENTS.

a. The Contractor shall maintain the Contract Documents, Shop Drawings and samples at the site, in good order and annotated daily to show all changes made during the construction process per Item SP-106. These shall be available to the RPR for examination.

100-2.3 ENGINEERING OBSERVATIONS.

a. Items noted by Engineer during construction and before final acceptance, which does not comply with the Contract, will be listed in accordance with the general conditions. These items will be sent to the Contractor for action. The Contractor shall have these items corrected.

b. The Contractor shall check items noted after acceptance during the warranty/guarantee period in the same manner as above.

100-2.4 EXISTING CONDITIONS.

a. Investigate site thoroughly and reroute all conduit/duct and wiring in area of new construction in order to maintain continuity of existing circuitry. Existing conduit/duct shown in the Contract Documents show approximate locations only. Contractor must verify and coordinate existing site conduit/ducts, wiring and piping. The bids shall include hand digging and all required rerouting in areas of existing conduit/ducts and/or pipes.

b. Check site and existing conditions thoroughly before bidding. Advise Engineer of discrepancies or questions noted. If any difference is discovered between the existing conditions and the Contract Documents, the Engineer shall be notified in writing immediately.

c. The Electrical Contractor shall investigate all existing systems within the construction limits and complete the performance verification prior to the beginning of any work, which could affect these existing systems.

d. Advise Engineer in writing of all deficiencies in existing system(s) prior to work. All systems will be assumed to be fully operational if written notification is not received by Engineer prior to work on system.

e. The work involved is in connection with existing systems/facilities, which must remain in operation while work is being performed. Work must be done in accordance with the schedule specified in the Contract Documents. Schedule all work to minimize the period when systems are inoperable. Request written permission and receive written approval from Engineer a minimum of 2 weeks in advance of any shutdown of existing systems. (FAA requires 45 days minimum notice.) Perform work required at other than standard working hours where outages cannot be accepted during regular working hours. Protect existing buildings and equipment during construction as required.

f. There may be piping, fixtures or other items, which must be removed or relocated in order to perform the alteration work. All conduit/duct, wiring, boxes, etc. that do not comply with the Contract Documents shall be removed or corrected to comply with the Contract Documents. All unused conduit/duct not removed shall be identified and a pull line shall be installed. Bid shall include all removal and relocation required for completion of the alterations and the new construction.

g. Special attention is directed to relocation of the existing power conduits and duct bank and communication systems. Cable counts, location, and function must be field verified before starting work.

h. The Contractor shall verify the areas, conditions, and features necessary to tie into existing construction. This verification shall be done prior to submittal of shop drawings, fabrication or erection, construction or installation. The Contractor shall be responsible for the accurate tie-in of the new work to existing facilities. This requirement assumes that existing items comply with current codes and standards.

100-2.5 SYSTEMS WARRANTY.

a. The work required under this division shall include a one (1) year warranty from the date of final acceptance unless required otherwise by the Contract Documents. This warranty shall be by the Contractor/Manufacturer to the Owner for any defective workmanship or material, which has been furnished under this contract. The Contractor/Manufacturer at no cost to the Owner shall perform replacement of defective workmanship or material for a period of one (1) year (or greater if noted in the Contract Documents) from the date of final acceptance of the system. This warranty shall not include light bulbs in service after one (1) month from date of substantial completion of the system. Explain the provisions of the warranty to the Owner during project close out.

b. In accordance with EB-67D, Light Sources Other Than Incandescent and Xenon for Airport and Obstruction Lighting Fixtures; all LED light fixtures with the exception of obstruction lighting (AC 150/5345-43) shall be warranted by the manufacturer for a minimum of four (4) years after date of installation inclusive of all electronics. This warranty shall be by the Contractor/Manufacturer to the Owner for any defective workmanship or material, which has been furnished under this contract. The Contractor/Manufacturer at no cost to the Owner shall

perform replacement of defective LED fixture workmanship or material for a period of four (4) years after date of installation.

100-2.6 SUBSTANTIAL COMPLETION.

a. All specified work shall be complete prior to final observation of work, and all forms and other information requested, including Operation and Maintenance Manuals, shall be submitted to the Engineer for approval one (1) week before the request for substantial completion of the work.

100-2.7 CONTRACTORS RESPONSIBILITIES.

a. Provide necessary layout, labor, material, equipment, tools, transportation, full time supervision and services required for the satisfactory and timely completion of the work in accordance with the Contract Documents.

b. Unload, store, protect and re-handle the materials required for this Contract until such time that material is in place. Provide protection of materials required of this contract after installation.

c. Provide all required transportation, erection, maintenance, dismantling and removal of temporary facilities and equipment required by this contract.

d. Provide all transportation, unloading, distribution, hoisting, rigging, material handling and scaffolding required installing the work of this contract.

e. Provide all engineering and layout required to perform the work from established base lines and benchmarks.

f. The Electrical Contractor shall coordinate the work of all the Electrical Contractors vendors and subcontractors to provide a fully functional and operating system.

g. Provide temporary electrical power and temporary water and sanitary sewer for this Contractor's field office, if required. Pay all utility company charges. Provide temporary power required for this Contractor's work.

h. Prior to start of work this Contractor is to inspect work performed by others on which this work is to be placed on or adjacent to, and report in writing to the Engineer, any condition found to be unacceptable. Failure to make said report shall constitute acceptance of the conditions found and any claims made thereafter due the unacceptable conditions will not be considered by the Engineer.

i. Provide all required coordination and supervision where work connects to or is affected by work of others and comply with all requirements affecting this work. Work required under other items of the Contract Documents to be performed by this Contractor shall be coordinated with the respective Contractor, and such work performed at no additional cost to the Owner including but not limited to electrical work in support of other trades as shown in the Contract Documents.

j. It is the responsibility of the Contractor to coordinate the exact required location of any electrical or electronic equipment, system, or cabinets to be installed or relocated. No existing equipment may be relocated without prior coordination and with approval of the Engineer.

k. Provide and pay for all permits, licenses, fees and inspections required for the performance of the work. The Contractor shall pay all sales, consumer, use and other taxes required in accordance with the law of the place of the project.

l. Provide all tests as required, per the Contract Documents and submit all test reports to the Engineer.

m. Provide all excavation, backfill, compaction, shoring and dewatering required for performance of the work.

n. Provide sleeves for all conduit/duct required as specified.

o. Protect all work of this Contract from damage and intrusion of dirt and foreign objects. Close off open ends of conduit/duct and sleeves on work, which is to be completed at a later date. Remove closure material prior to continuance of work.

p. Prior to Final Inspection, submit to the Engineer, all Record Drawings and Operation and Maintenance Manuals as specified. Instruct Owner's maintenance personnel in the operation and maintenance of the systems as required by the Contract Documents.

q. The above is not all inclusive of the work described by the Contract Documents, which form the basis for this Contract, but is presented for the Contractor's convenience.

100-2.8 EXISTING UTILITIES.

a. The Contractor is solely responsible for the location of all existing utilities within the project limits. Please refer to SP-104 for additional requirements.

b. The Contractor is solely responsible for the protection of all existing utilities within the project limits. All manholes, hand holes, light bases, conduits and ducts shall be kept tightly closed and sealed during all phases of construction. The items may be opened in support of the work but shall be resealed or closed or covered immediately upon completion of the specific task that required them to be opened.

BASIC MATERIAL & METHODS

100-3.1 REQUIREMENTS OF BASIC MATERIALS AND METHODS.

a. The work shall include the furnishing of the systems, equipment and material specified in this Division and as called for in the Contract Documents, to include supervision, operations, methods and labor for the fabrication, installation, start-up and tests for the complete electrical installation. Provide the necessary inter-trade/Contractor coordination for the installation to be in a neat and work person like manner.

b. Drawings for the work are diagrammatic, intended to convey the Scope of the Work and to indicate the general arrangement and locations of the work. The drawings shall not be scaled for exact sizes or locations. Because of the scale of the drawings, certain basic items such as: conduit/duct fittings, access panels, sleeves, pull and junction boxes may not be shown. Where such items are required by Code or by other items or where they are required for proper installation of the work, such items shall be included. Coordinate final equipment locations with

governing architectural, civil and structural drawings as applicable. Layout equipment before installation so that all trades may install equipment in the space available.

c. Equipment Specifications may not deal with minute items such as components, parts, controls and devices, which may be required to produce the equipment performance specified, or as required to meet the equipment warranties. Where such items are required, the Contractor/Supplier of the equipment shall include them, whether specifically called for or not.

d. Conduit/duct routed through the building/structure that interferes with other equipment and construction shall not constitute a reason for an extra charge. Equipment, conduit/duct, and fixtures shall fit into available spaces in the building/structure; do not introduce these into the building/structure at such times or in such manner as to cause damage to the structure. Equipment that requires servicing shall be readily accessible.

e. Locate all openings required for work performed under this item. Provide sleeves, guards or other acceptable methods to allow passage of items installed under this item.

f. Keep cutting and patching to a minimum. Insofar as possible, determine in advance the proper chase size and openings necessary for the work.

g. Where cutting and patching are required due to an error of the Contractor, or where the Contractor has not given enough advance notice of the need for holes, recesses, and chases, patching shall be performed by those trades skilled in the use of the materials involved and shall be done at the Contractor's expense.

h. Any cutting of work in place shall be patched and decorated by such mechanics and in such a manner that the quality of workmanship and finish shall be compatible with that of adjacent construction.

i. The location of electrical work is indicated on the drawings. The Engineer may adjust exact locations of new work as work progresses. Before any item is installed, the indicated location may be changed by twenty-five (25) feet in any direction without additional cost.

j. All penetrations through roof, wall or floor shall maintain structure fire rating and environmental barriers. Any roof penetrations shall be made by a state licensed roofing Contractor and shall maintain any in place roofing warranty.

k. Surface mounted fixtures, outlets, cabinets, conduit/duct, panels, etc., shall have finish or shall be painted as directed by Engineer. Paint shall be in accordance with other applicable items of the Contract Documents.

l. All materials utilized shall be suitable for the environment encountered. No combination of materials shall be used that forms an electrolytic coupling of such nature that in the presence of moisture corrosion is accelerated.

m. In general, all relays, contactors, panelboards, dry type transformers, disconnect switches, and circuit breakers are to be supplied and manufactured by the same manufacturer and shall be submitted and accepted equivalent to that specified.

n. Where the requirements of another division, item, or part of these Contract Documents exceed the requirements of this division, those requirements shall govern.

o. Make electrical connections to regulators, transformers, instruments, mechanical equipment, controls and at other locations as required with approximately 3 feet (12" minimum) of liquid tight flexible metal conduit. Grounding type liquid tight flexible metallic conduit connectors shall be used. Determine the requirements from the Contract Documents and the accepted manufacturer drawings.

p. Provide inserts, hangers, supports, braces, and anchor bolts as necessary for all work called for under the Contract Documents.

q. Provide equipment grounding conductor in all conduit/ducts, for all circuits, except series airfield lighting.

r. All galvanized materials shall be hot-dip galvanized after fabrication, conforming to ASTM A-386 and/or A-153, unless noted otherwise (UNO).

s. Unless noted otherwise, all panelboards, junction boxes, wire ways, etc., shall be spaced off the concrete structure by using a Unistrut P-1060 series square washer or accepted equivalent between the mounting surface and the equipment at each mounting point. Equipment as listed above, mounted on Unistrut or accepted equivalent shall have Unistrut P-1060 series square washer, Unistrut P-28XX flat plate fitting or accepted equivalent installed between the Unistrut channel or accepted equivalent and the equipment at each mounting point.

t. All bolted connections and equipment mountings shall utilize two flat washers, lock washer and hex head bolting hardware, unless noted otherwise.

u. Unless noted otherwise, all wire sizes are based on a 90 Deg. C., THWN-2, 600-volt insulation, copper conductors, not more than three single insulated conductors, in raceway, in free air. The conduit/duct sizes are based on the use of THWN-2, 600-volt insulated conductors. The Contractor shall make the necessary increase in conduit/duct sizes for other types of wire insulation. In no case shall the conduit/duct size be reduced. The minimum power circuit wire size shall be #12 AWG.

v. Conductor sizes may have been adjusted due to voltage drop or other engineering considerations. Equipment provided by the Contractor shall be capable of accepting the quantity and sizes of conductors shown in the Contract Documents. All conductor pigtails, cable step-down adapters, cable step-up adapters, terminal blocks and splicing materials necessary to complete the cable termination/splice shall be considered incidental to the respective pay items provided.

w. All equipment enclosures, junction boxes, wire ways, pull boxes, etc. utilized in damp, wet or exterior locations shall be NEMA 4X stainless steel. All mounting channel, hardware, nuts, bolts, lock washers, etc. utilized in damp, wet or exterior locations shall be stainless steel.

x. All electrical conductors, windings, bus bars, etc. shall be high conductivity (98% conductivity) copper.

y. This Contractor shall furnish and install all required overcurrent protection required by the NEC and the Contract Documents. The overcurrent protection shall be sized according to the equipment nameplate data.

z. Powder-actuated fasteners will not be allowed without express written approval of the Engineer. No fasteners shall pierce the structure until accepted by the Engineer.

aa. Use Ideal NOALOX antioxidant compound or accepted equivalent on all aluminum to aluminum mechanical or electrical connections. Use Thomas and Betts KOPR-SHIELD or accepted equivalent on all rigid galvanized steel conduit connections and all copper grounding connections using mechanical lugs. Use an approved anti-seize compound on all bolted connections.

100-3.2 ELECTRICAL REFERENCE SYMBOLS.

a. Symbols used in the Contract Documents are defined in the Electrical Legend. Not necessarily will all symbols defined be applicable to the project.

100-3.3 ACTIVE SERVICES.

a. Existing active services, water, gas, sewer, electric, communication, jet fuel, etc. when encountered, shall be protected against damage. Do not prevent or disturb operation of active services, which are to remain. If active services are encountered which require relocation, make request to Authorities Having Jurisdiction (AHJ) for determination of procedures. Where existing services are to be abandoned, they shall be terminated in conformance with requirements of the AHJ, Utility or Municipality having jurisdiction.

100-3.4 CODES AND STANDARDS.

a. Install in accordance with latest edition of the National Electrical Code and the regulations of governing Federal, State, County, local and other applicable codes, including the Utility Companies. Where a conflict in code requirements occurs the most stringent requirement shall govern. The Contractor shall be responsible to obtain and pay for all required licenses, fees and inspections including meter installation fee. The cost for such shall be included in the bid price.

b. The work shall meet the requirements and recommendations of applicable portions of the latest editions of these laws, codes and standards:

1. OSHA 1910 & 1926

2. NFPA 70, National Electrical Code

3. NFPA 70E, Standard for Electrical Safety in the Workplace

4. NFPA 101, Life Safety Code

5. NFPA 409, Standard on Aircraft Hangars

6. NFPA 780, Standard for the Installation of Lightning Protection Systems (UL 96, UL 96A)

7. FAA Advisory Circulars, Engineering Briefs and Orders

8. Applicable local building code

9. Florida Building Code Project State Specific

10. ANSI C2, National Electrical Safety Code

11. NEMA Standards (NEMA)

12. Underwriter's Laboratories (UL)

13. Institute of Electrical and Electronics Engineers (IEEE)

14. FDOT - Standard Specifications for Road and Bridge Construction Project State Specific

15. FDOT – Design Standards Index Project State Specific

16. AWS D1.1, Structural Welding Code – Steel

17. Merriam-Webster Dictionary

The above is not all inclusive of applicable codes and standards but is presented for the Contractors convenience.

The advisory circulars are available online at:

https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.list?display=current&q=

100-3.5 LISTED AND LABELED.

a. All materials shall be new and free of defects and shall be U.L. listed, bear the U.L. label or be labeled or listed with an accepted, nationally recognized Electrical Testing Agency. Where no labeling or listing service is available for certain types of equipment, test data shall be submitted to prove to the Engineer that equipment meets or exceeds available standards. All U.L. listed material shall be used only for the intended purpose.

100-3.6 UTILITY COMPANY FEES, CHARGES, AND COSTS.

a. It is the Contractor's responsibility to contact the applicable Utility Company(s) to determine if any fees, charges or costs will be due the Utility Company(s) as required by the Utility Company(s) for temporary power, installations, hook-ups, etc. This fee, charge or cost shall be included in this Contractor's price.

100-3.7 TESTING – QUALITY CONTROL.

a. Systems shall be tested by the Contractor, in the presence of the RPR, and placed in proper working order prior to demonstrating systems to the Owner. Refer to the requirements in each item for other applicable standards.

b. Provide all tests as required, per the Contract Documents and submit all test reports to the RPR. Costs of all testing shall be borne by the Contractor and shall be considered incidental to the respective pay item of the tested item. The Contractor shall perform all Quality Control in accordance with the Contract Documents and the Contractor’s Quality Control Plan General Conditions. The Owner will perform Quality Assurance/Acceptance.

c. After work is completed a load balance test shall be made to demonstrate that with full lighting and mechanical load the balance between phases is within 5%. Unbalance beyond this limit shall be corrected.

d. Perform such tests as required by AHJ over the site.

e. Testing methods shall be acceptable to the Engineer and shall be submitted to the RPR for review, a minimum of thirty (30) days prior to the scheduled test.

100-3.8 LAMINATED PHENOLIC PLASTIC NAMEPLATES.

a. Contractor shall provide nameplates for wiring systems and equipment as called for herein. All nameplates shall have beveled edges and one-half inch (1/2") lettering. If equipment is smaller than ten inches by six inches (10"x 6"), one-quarter inch (1/4") lettering may be used. Smaller lettering may be used with permission of the RPR.

b. Nameplates shall be laminated phenolic plastic, black front and back with white core, with lettering etched through the outer covering. White engraved letters on black background. Emergency systems shall use red front and back with white core for nameplates. Attach nameplates with stainless steel pop rivets, sealed with clear silicon caulk. Adhesive may be used only on panelboard interiors. Where conditions do not warrant piercing the enclosure "LOCTITE" brand adhesive or accepted equivalent may be used with permission of the RPR.

c. Coordinate nameplates with Contract Documents and submit 1 to 1 scale detail of all nameplates to RPR for review.

d. All electrical equipment, enclosures, pull boxes and all similar items in the sole opinion of the RPR shall be equipped with nameplates. Examples are all constant current regulators, motors, pushbutton stations, hand holes, pull boxes, junction boxes, manholes, control panels, system cabinets, terminal cabinets, time switches, disconnect switches, panelboards, circuit breakers, contactors, relays, high voltage boxes and cabinets. Special electrical systems shall be identified at junction and pull boxes, terminal cabinets and equipment racks.

e. Nameplates shall adequately describe the function of the particular equipment involved. Where nameplates are detailed in the Contract Documents, inscription and size of letters shall be as shown. Nameplates for panelboards and switchboards shall include the panel designation, panel name, source(s) of power and voltage and phase of the supply. For example, "Equip YY, Panel A, fed from Panel XYZ, 480/277V, 3-phase, 4-wire." The unique name of a particular piece of equipment shall be used consistently on all nameplates referencing that particular piece of equipment. Equipment name/numbers utilized shall be consistent throughout the entire system. When equipment has multiple sources of power, all sources of power shall appear on the nameplate. Power source descriptions shall contain as a minimum the information listed above. Nameplates shall include as a minimum the following.

1. Equipment Number

2. Equipment Name

3. Power Source(s)

4. Voltage Level and number of phases (for each power source)

f. Panelboard and distribution panels shall have each breaker position identified with phenolic labels.

g. All major pull and junction boxes in service areas, tunnels, above accessible ceilings and in accessible chases shall have nameplates identifying the feeder or system. This shall include the access cover on lighting pole bases.

h. Systems with conductors exceeding 100 volts to ground shall have voltage identification nameplates with one-half inch (1/2") high letters on all panels, switches, pull boxes and junction boxes.

100-3.9 CONCRETE WORK.

a. Concrete bases and pads for all equipment furnished by Contractor shall be the responsibility of Contractor unless noted otherwise.

b. Furnish and install reinforced concrete pads for transformers, switchgear, and motor control centers, etc. of size as shown in the Contract Documents. Chamfer the top edges 1". Trowel all surfaces smooth, provide broom finish where noted. Reinforce the pads as shown in the Contract Documents.

c. Concrete equipment pads shall be installed by tradespersons skilled in concrete work. Equipment pads shall be level within one-eighth inch (1/8”) in 10 feet (10’). Equipment pads not meeting the previous requirements shall be removed and replaced at the Contractor’s expense.

d. The Contractor shall furnish all equipment anchor bolts and shall be responsible for their proper installation and accurate location.

100-3.10 EXCAVATING, TRENCHING AND BACKFILLING.

a. This Contractor shall do excavating necessary for light bases, underground wiring, conduit, duct banks and other underground work and shall backfill trenches and excavations after work has been inspected. Care shall be taken in excavating that walls and footings and adjacent load bearing soils are not disturbed in any way, except where lines must cross under a footing, pad or other structural item. Where a line must pass under a footing, pad or other structural item the crossing shall be made by the smallest possible trench to accommodate the conduit/duct. Excavations shall be kept free from water. No greater length of trench shall be left open in advance of conduit/duct installation than that, which is authorized or directed by the RPR.

b. Roots shall be removed to a level of eighteen (18") below finished grades and deeper as required for conduit/duct runs, manholes and light pole bases. No roots shall be allowed to remain under the work.

c. Backfill about the work shall be placed, where practical, as the work of construction progresses. Backfilling on or against concrete work shall be done only when directed. Backfilling of conduit/duct lines shall progress as rapidly as the testing and acceptance of the finished items of the work will permit and shall be carried to a crown approximately six inches (6") above the existing grades. In backfilling around conduit/duct lines, selected material shall be compacted firmly around the conduit/duct. Fill and backfill shall be clean and free from vegetable matter and refuse.

d. All loose materials shall be removed from all excavations for electrical items. The bottom of the excavation shall be compacted to the following criteria:

SOIL TYPE	DESIGN AIRCRAFT GROSS WEIGHT	TEST STANDARD	UNDER PAVEMENT	IN TURF
<30% RETAINED ON ¾" SIEVE	>60,000 LBS	ASTM D1557	100%	95%
<30% RETAINED ON ¾" SIEVE	≤60,000 LBS	ASTM D698	100%	98%
>30% RETAINED ON ¾" SIEVE	>60,000 LBS	AASHTO T-180	100%	95%
>30% RETAINED ON ¾" SIEVE	≤60,000 LBS	AASHTO T-99	100%	95%

Backfill shall comply with the same compaction requirements.

e. All trenches and other excavation left open by necessity shall be barricaded and guarded as required by OSHA or applicable codes and regulations.

100-3.12 WELDING.

a. All welding and weld procedures shall be in accordance with AWS D1.1, Latest Edition. Qualifications of welders and welding operators shall be in accordance with AWS D1.1, Latest Edition. The welder qualification test shall be performed on a 1" A-36 Test Coupon in the 3G and 4G positions. The welder qualification shall be current within 12 months of the work being performed. Weld inspections shall be per the criteria set forth in AWS D1.1 for visual weld inspection.

100-3.13 ELECTRONIC DRAWING FILES.

a. Electronic versions of the Contract Documents may be available for the Contractors use. Please be advised that Engineer cannot be held responsible for third party use of this information, and furthermore, that this information is supplied as a professional courtesy. This applies to all electronic data files transmitted on behalf of Engineer to third parties.

b. The files are without warranty as to performance, accuracy, or freedom from error, or as to any results generated through their use at any time. Written dimensions in file, details, specifications take precedence.

c. The files being transmitted are the intellectual property of Engineer and as such are protected by the copyright laws of the United States. The files are being transmitted for the single use on this project only.

d. The electronic files provided are non-sealed and unofficial versions of the Contract Documents that have been created by the Engineer. The electronic files are provided only for the convenience of explicitly authorized users.

e. The hard copy Conformed Documents that have been provided are the only official documents that may be relied upon for accurate presentation. The electronic files provided will be at the authorized user's risk and does not pose any risk or liability to the Owner or Engineer.

f. Engineer does not guarantee or warrant the authenticity of electronic files. The authorized users agree and recognize that the electronic files may unintentionally become corrupted or modified without the authorization of the Engineer.

g. Written dimensions will govern over scaled values.

h. AutoCAD files were developed using base files provided by others.

i. Variations in printer drivers may cause the electronic file presentation to vary considerably.

DESIGNATION OF MATERIALS

100-4.1 DESIGNATION OF MATERIALS.

a. Where equipment or materials are specified using the name and catalog number of one manufacturer, that equipment or material specified shall set the quality and functionality of the item. Equivalents accepted by the Engineer will be acceptable.

b. Where equipment or materials are specified using the name and catalog number of more than one manufacturer, that equipment or material shall be one of those specified. No alternative will be acceptable.

c. Where no brand name is specified, the source and quality shall be subject to the Engineer's review and acceptance.

d. When a product is specified to be in accordance with a trade association or government standard, at the request of Engineer, Contractor shall furnish a certificate that the product complies with the referenced standard. Upon request of the Engineer, the Contractor shall submit supporting test data to substantiate compliance.

e. The Engineer shall be the sole judge of whether the proposed "equivalent" is suitable for use in the work.

f. The Engineer reserves the right to reject any and all equipment, materials or procedures, which, in the Engineer’s opinion, does not meet the system design and the standards and codes, shown in the Contract Documents.

g. Each Bidder represents their bid is based upon the materials and equipment described in the Contract Documents.

PROTECTION OF MATERIALS, EQUIPMENT AND WORK

100-5.1 PROTECTION OF MATERIALS, EQUIPMENT AND WORK.

a. Materials shall be stored to assure the preservation of their quality and fitness for the work. Stored materials, even though accepted before storage, shall be subject to reinspection prior to their use in the work. The Contractor shall coordinate the storage of all materials with the RPR.

b. The Contractor shall protect electrical raceway, cable, lighting fixtures, associated support systems, and all other electrical items against damage from movement of equipment and material, welding, flame cutting, and other construction damage. Raceways and supporting structures for raceway and lighting fixtures shall not be used as access scaffolding at any time. Whenever welding or flame cutting operations occur above or near raceways, cables lighting fixtures, etc not shielded from such operations by concrete floor or other protective covers, the Contractor shall protect the items from damage by means of fireproof boards or blankets. Damaged materials shall be repaired or replaced, by and at the Contractor's expense, subject to the RPR's direction and acceptance.

c. Surfaces of most equipment, such as panels, switchgear, transformers, constant current regulators (CCR) and circuit breakers, are finished at the factory. Great care shall be exercised to prevent damage to this original finish during installation of the equipment and during construction work.

d. If the factory finish is damaged during construction, the entire surface of the damaged component shall be refinished by and at the expense of the Contractor.

e. The refinished surface shall be equivalent in every respect to the original surface, including color, texture and smoothness. Refinishing paint, if furnished with the equipment, may be used; otherwise, the paint shall be obtained from the equipment manufacturer.

f. All cut edges of galvanized materials and marred or scratched galvanized surfaces shall be repaired using LPS-1G cold galvanizing compound or accepted equivalent.

GENERAL CONSTRUCTION REQUIREMENTS

100-6.1 GENERAL CONSTRUCTION REQUIREMENTS.

a. Provide the bracing, shoring, rails, guards, and covers necessary to prevent damage or injury. Do not leave energized electrical items exposed or unprotected. Protect personnel from exposure to contact with electricity. Deliver equipment and materials to the job site in their original, unopened, labeled containers. Store ferrous materials to prevent rusting. Store finished materials and equipment to prevent staining and discoloring.

b. Maintain separation between stainless steel items and carbon steel items to prevent contamination of stainless-steel item and subsequent rust stains on stainless steel item.

c. All sheeting, shoring, dewatering and cleaning necessary to keep trenches and their grades in proper condition for the work to be continued, including the removal of water by mechanical means, shall be the Contractor's responsibility.

METHOD OF MEASUREMENT

100-7.1 METHOD OF MEASUREMENT.

a. The items described in Item SP-100 are incidental to other pay items and shall not be measured for payment.

BASIS OF PAYMENT

100-8.1 BASIS OF PAYMENT

a. No direct payment shall be made for the work described in Item SP-100. The work described in Item SP-100 is incidental to other items and shall be paid for in the respective bid item of which it is a component part.

END OF ITEM SP-100

ITEM SP-104 GENERAL ELECTRICAL SAFETY REQUIREMENTS AND TEMPORARY AIRFIELD LIGHTING

DESCRIPTION

104-1.1 PURPOSE:

a. The purpose of this item is to assist in establishing the proper safety guidelines necessary to protect aircraft, passengers, crews, the general public, Owner, Engineer, all workers and vehicles involved in their daily tasks.

b. The Contractor is solely responsible for all issues related to the safety program and guidelines and implementation of such programs and guidelines necessary to protect aircraft, passengers, crews, the general public, Owner, Engineer, all workers and vehicles involved in their daily tasks.

c. The Contractor shall comply with FAA Advisory Circulars, FAA Engineering Bulletins, specific airport requirements, OSHA 29CFR1910, OSHA 29CFR1926 and NFPA 70E as minimum requirements.

104-1.2 REFERENCED STANDARDS AND CODES:

a. All applicable requirements of the below listed advisory circulars, codes, standards and related reading, as a minimum, shall be compiled with:

1. AC 150/5200-18, Airport Safety Self-Inspection

2. AC 150/5210-5, Painting, Marking and Lighting of Vehicles

3. AC 150/5340-1, Standards for Airport Markings

4. AC 150/5340-18, Standards for Airport Sign Systems

5. AC 150/5340-26, Maintenance of Airport Visual Aid Facilities

6. AC 150/5340-30, Design and Installation Details for Airport Visual Aids

7. AC 150/5370-2, Operational Safety On Airports During Construction

8. 29 CFR Part 1926/1910, Occupational Safety and Health Standards

9. NFPA 70, National Electrical Code

10. NFPA 70E, Standard for Electrical Safety in the Workplace

11. ANSI C2, National Electrical Safety Code

The Contractor is responsible for obtaining and using the latest edition of the referenced documents. This list is not all inclusive but is offered as a convenience to the Contractor. The advisory circulars are available online at:

https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.list?display=current&q=

104-1.3 GENERAL SAFETY PROVISIONS:

a. Contractor shall take safety and health measures in performing work under this contract. Contractor shall meet with the Engineer and Owner to develop a mutual understanding relative to administration of the safety plan. The Contractor is subject to and shall comply with all applicable federal, state and local laws, regulations, ordinances, codes and orders relating to safety and health in effect on the date of this contract. Where the contract general conditions, special provisions or other parts of the Contract Documents also apply, the stricter of the documents shall govern.

b. As a minimum workplace safety shall comply with NFPA 70E, Standard for Electrical Safety in the Workplace, OSHA, federal, state and local requirements. Where a conflict in requirements occurs the most stringent requirement shall govern.

c. During the performance of work under this contract, the Contractor shall comply with procedures prescribed for control and safety of persons visiting the project site.

d. Contractor is responsible for the Contractor's personnel and for familiarizing each of the Subcontractors with safety requirements.

e. Contractor shall advise the Engineer of any special safety restrictions established so that Owner and Engineer personnel can be notified of these restrictions.

f. The Contractor shall be solely and completely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work. The Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. All employees on the work and all other persons (including but not limited to the general public) who may be affected thereby,

2. All the work and all materials or equipment to be incorporated therein, whether in storage on or off the site,

3. Other property at the site, adjacent thereto, or utilized by the Contractor including but not limited to trees, shrubs, lawns, walks, pavements, structures, underground facilities, and other utilities not designated for removal, relocation or replacement in the course of construction regardless of whether or not such other property is indicated in the Contract Documents.

g. The installation and/or removal of lighting equipment may be critical to airport operations; therefore, the Contractor shall follow work schedules established in the Contract Documents or as directed by the RPR. The system shall be installed in accordance with the Contract Documents, FAA criteria, the National Electrical Code and/or federal, state, or local code requirements.

h. The Contractor shall generate and submit for approval A Maintenance of Power Plan for all electrical services impacted by this project. The Contractor shall always maintain power (permanent or temporary) to all FAA and airport owned facilities during this project. Power outages may be scheduled at the FAA and Owners convenience. Scheduling and duration of any power outage is at the sole discretion of the power system owner. Cost of maintenance of power and all necessary materials, labor transportation, supervision, coordination and all appurtenances shall be considered incidental to the SP-104-1 or SP-104-2 pay items.

i. The Contractor shall provide temporary wiring as required to reconnect existing circuits to provide guidance for aircraft to pass through the construction areas on those taxiways/runways, which must remain open. The Contractor, in conjunction with the Owner's Maintenance Department, shall perform a visual lighting check of all lighting circuits within the Contractor's area of responsibility before dark each day (or at additional times as designated by the RPR) to assure that they are fully functional. In the event of failure, the Contractor shall immediately take steps to restore operation.

104-1.4 FIRE PREVENTION AND PROTECTION:

a. All tools producing sparks or heat, open-flame heating devices, operations utilizing such devices, etc. shall be in accordance with the airport fire department and airport "Burn Permit Procedures". Work shall not start until all requirements of the burn permit procedures are met

b. Open fires, salamanders and open-flame heating devices will not be permitted except by special approval in writing. Such permission will not be granted unless the Contractor has taken reasonable precautions to make such devices safe. Burning trash, brush or wood on the project site will not be permitted. Approval for open fires and open-flame heating devices will in no way relieve the Contractor from the responsibility for any damage incurred because of fires.

c. Flammable liquids shall be stored and handled in accordance with NFPA and OSHA requirements.

d. Smoking shall not be permitted within the AOA or in areas such as paint storage, fuel storage, and posted no smoking areas.

e. Welding, flame cutting, melting and other such operations in all operating areas, shall not be permitted until approved at the beginning of each workday by the RPR. The RPR may approve longer periods of time for welding and burning in some operating areas if the detailed safety procedures are established beforehand. Operating open flame devices shall not be left unattended in any area.

f. Contractor shall provide the necessary firefighting equipment, fire prevention methods and fire watch.

g. A Contractor's employee shall be assigned as fire watch for every welding and burning operation. The fire watch shall be properly trained in firefighting techniques and the operation of

the fire extinguishers. The fire watch shall be equipped with two full 15-pound Class A, B & C fire extinguishers and shall check all areas around and below the welding or burning operation for fires. The fire watch shall continue this check for at least 60 minutes after the completion of the welding or burning operation.

h. Contractor shall discontinue all burning, welding, or cutting operations, one hour prior to the end of the normal workday. Contractor shall provide a fire watch to remain at the site for one hour after discontinuing these operations. This fire watch shall make a thorough inspection of the area for possible sources of latent combustion. Any unsafe conditions shall be corrected.

i. During operations involving possible fire hazard, the Contractor shall notify the RPR and not proceed until clearance is obtained in writing. The RPR may request a standby from the Fire Station. However, this does not relieve the Contractor of responsibility for welding and cutting safety.

j. Clean up of scrap materials and waste of this Contractor shall be completed as a minimum daily or more often as required to maintain airport operations.

104-1.5 TEMPORARY EXITS AND ENTRANCES:

a. Such passageways shall provide adequate fire protection and safety of Owner personnel and representatives.

104-1.6 SWITCHING:

a. Electrical switching required for clearance to work on equipment operating from electrical circuits will be performed only by Owner personnel authorized as safety operators for the specific equipment or as specifically authorized by the Owner.

104-1.7 REMOVAL OF EQUIPMENT:

a. When permanently removing equipment, the electrical wiring, conduit/duct and control boxes shall be removed to the source of feed, unless otherwise specified or indicated.

b. After equipment has been removed, the electrical wiring diagrams, schematics, etc., shall be marked to show the change.

c. Conduit/duct not removed shall have a pull string installed.

104-1.8 OTHER SAFETY REQUIREMENTS:

a. Temporary wiring shall comply with NEC. Indiscriminate use of extension cords, portable cable or junction boxes creating tripping hazards as well as overloaded circuits will not be permitted.

b. Unplug or disconnect energy source of power tools when not in use.

c. Before maintaining or repairing any electrical equipment, it shall be disconnected from the power source.

d. Do not use any equipment that has frayed cords or three-wire plugs that have had the grounding prongs removed. Faulty equipment and tools shall be repaired by a qualified person**.**

e. Do not use metal ladders when working on electrical equipment.

104-1.9 EXISTING UTILITIES:

a. The Contractor is solely responsible for the location of all existing utilities within the project limits. Prior to initiation of any construction in the field, the Contractor shall provide a written notice (return receipt requested) to each of the utility companies including Gulf Power, along with the various airport departments and Florida Sunshine One Call as prescribed by state law. The Contractor shall provide the Owner and Engineer with a copy of the receipt of said written notification to each of the utility companies or airport departments. This requirement is in addition to any other state laws regarding public notification prior to excavation.

EXCAVATION

104-2.1 EXCAVATION OPERATIONS:

a. Prior to any excavation or demolition, the Contractor shall obtain an "Airport Dig Permit".

b. Methods of excavation, means of earth support, and manner of backfill shall be conducted with consideration for the safety of persons and work, and prevention of damage to adjacent pavement, utilities, structures and other facilities, due to settlement, lateral movement, undermining and washout. Minimum requirements for trench shoring and bracing shall be in accordance with OSHA, State and local requirements. Excavation shall be performed in a manner to prevent surface water and subsurface or groundwater from flowing into excavations, and to prevent water from flooding conduit/duct trench and adjacent or surrounding area.

PROTECTION OF WORK

104-3.1 PROTECTION OF WORK:

a. Provide adequate stand-by mechanical equipment for emergency use.

b. Excavations shall have substantial barricades and be posted with warning signs for the safety of persons. Warning lights shall be provided during hours of darkness.

c. Barricades shall be erected immediately around manhole openings when covers are opened/removed.

d. Prior to performing any excavation work or any surface penetrations 6 inches or deeper (such as driving stakes more than 6 inches in the ground) on any ground surface, for personnel safety and to prevent possible interruption of major utility services encountered during excavation, the following procedures shall be followed:

1. Refer to 104-1.9.

2. The Contractor shall obtain from the RPR, local utilities, etc., the current up-to-date subsurface utility drawing of the particular area to be worked on.

3. All agencies/utilities, etc. that may be affected by the excavating shall be contacted by the Contractor so that all lines, pipes, etc. can be marked/staked. The Contractor shall be responsible to maintain the utility locate markings.

4. The Contractor shall stake out subsurface high voltage cables, communication cables, pipelines, all subsurface utilities, etc., indicated within the scope of the work contemplated. All subsurface utilities shall be located by hand digging; hand digging shall extend for 5 feet on both sides of the subsurface utility. Hand digging and protection of existing systems shall not be paid for separately but shall be considered incidental to the item being installed.

5. After hand exposure of cable or pipelines, the Contractor shall obtain agreement from the RPR, AHJ, Agency/Utility on how much closer to cable or pipe the excavations can be permitted.

6. Detectable printed mylar foil warning tape, color coded, printed with the words “CAUTION ELECTRIC LINE BELOW,” red, “CAUTION COMMUNICATION LINE BELOW,” orange, “CAUTION WATER LINE BELOW,” blue, “CAUTION FUEL LINE BELOW,” yellow, etc., shall be installed over the buried utilities. Material and installation of detectable tape shall be in accordance with L-110.

7. Contractor shall notify the RPR, 72 hours prior to the start of excavation work or surface penetration, to enable the RPR to review measures being taken to prevent hazard to employees and to prevent possible damage to subsurface utilities. Where emergency conditions preclude the 72 hours advance notification, Contractor shall nevertheless inform the RPR of the Contractor’s intention to initiate work prior to actual start of activity.

8. After all underground utilities have been located and staked, the Contractor shall proceed with excavating work, or other surface penetration work. The Contractor, however, shall temporarily halt any machine excavation work or other surface penetration when approaching within 5 feet of the staked-out cable or pipeline, until Contractor has hand excavated down to expose the underground utility to exactly fix its location.

9. No digging, dirt moving, or other heavy equipment shall physically enter any construction area before all FAA utilities, airport utilities and all other underground utilities have been located and properly staked out. It is the Contractor's responsibility to locate all utilities before digging, sawing, coring, boring, etc. Any damage caused by digging, sawing, boring coring, etc., is the Contractor's responsibility for repair. Any damage must be reported immediately to the RPR. No repair shall be attempted without approval.

10. All electrical cables shall be disconnected before excavation is attempted.

11. Provide minimum of 48” undisturbed earth cover or 1” thick steel plate over electrical conduit/duct, cables or other utilities when heavy equipment is being used in the area to protect underground systems/utilities. In addition, protect utilities in accordance with AHJ requirements.

12. The requirements listed above shall be considered incidental to the item for which the excavation is required.

13. A written description of the utility protection measures shall be submitted to the RPR for review by the Owner, FAA and AHJ.

SAFETY TAGGING AND LOCKOUT

104-4.1 SAFETY WITH ELECTRICAL CIRCUITS AND EQUIPMENT:

a. No one may work on an energized circuit without written permission from the Contractor's On-Site Supervisor. The Contractor's On-Site Supervisor shall review the circumstances and the necessary safety precautions with the RPR, prior to giving permission for the energized work. The Contractor assumes all liability in connection with any work on energized circuits.

b. No one may disconnect or cause to be disconnected any electrical circuit before permission is requested from and granted by the Owner or authorized representative through the RPR.

c. Identification markings on light and power circuits shall not be relied on for establishing electrically safe work conditions. Always verify the proper safe "deenergized" conditions with properly operating test equipment.

d. Before any circuit supplying radar, ILS, weather, VORTAC, airport beacon, runway/taxiway lighting equipment or any other equipment is disconnected, permission must first be granted by the systems Owner or authorized representative, and, if applicable, FAA Sector Field Office and the Airport's Air Traffic Control Tower. After permission is granted, the following requirements must be compiled with. **THE FAA REQUIRES 45 DAY NOTICE PRIOR TO WORKING ON OR DISTURBING FAA CABLES OR EQUIPMENT.**

e. As a minimum the LOCK OUT/TAG OUT (LOTO) procedure shall comply with the Owner's requirements, OSHA1910.147, OSHA1910.147 Appendix A and NFPA 70E. If conflicts between standards arise the stricter requirement shall apply.

f. Comply with OSHA 1910.333, Selection and Use of Work Practices.

g. A qualified person shall perform a hazard risk assessment, job safety plan, and job briefing in accordance with NFPA 70E.

h. A qualified person shall create an Electrically Safe Work Condition in accordance with NFPA 70E.

i. Restoration shall be accomplished in a safe manner and locks/tags removed only by the Electrical Contractor's qualified person who placed the locks and tags in the presence of the Owner or authorized representative. Should the qualified person who placed the lock/tag not be available, see OSHA 1910.333(b)(2)(v)(C).

j. The Owner or authorized representative shall record time, date and operational status of circuit after restoration.

k. Electrical circuits and apparatus shall be operated at these facilities only by qualified persons and authorized personnel.

l. The RPR shall be provided contact names and phone numbers for two qualified persons (one as primary, one as backup) to provide for removal or addition of any Contractor LOTO work during off hours. The qualified person(s) shall respond onsite within one hour of initial contact.

104-4.2 TEMPORARY AIRFIELD LIGHTING AND SIGNAGE:

a. Temporary airfield electrical fixtures and conductors are allowable when necessary, but shall be installed as follows:

1. Temporary lights shall be bolted to the pavement in a manner rendering the light stationery and allowing space for conductors to enter or exit and to be spliced.

2. When the above is not practical, lights shall be fastened to a weighted object adaptable for the purpose and of sufficient weight to inhibit movement by jet engine blast.

3. Temporary conductors supplying temporary lights shall be installed in a rigid galvanized steel conduit system and secured every five feet to prevent movement by jet engine blast. See temporary airfield lighting details.

4. All joints or splices in temporary conductors shall have heat shrink tubing with integral sealant or tape applied to secure mechanical and electrical connection and prevent water entry.

5. All temporary plug-in connections shall comply with the permanent wiring detailed in L-108 and the wiring details.

6. Temporary lights and signage shall conform as closely as possible to permanent locations normally on the taxiway or runway but shall guide aircraft in a safe path. Please refer to the temporary airfield lighting details provided in the Contract Documents for additional requirements.

b. Closed taxiways and runways shall be blacked out in a manner acceptable to FAA, RPR and Airport Operations and said black/out/marking/lighting shall be kept in acceptable condition.

1. The required method of temporarily bypassing a fixture is to unplug and bypass the primary side of the L-830 isolation transformer.

2. Alternately, pipe sleeves may be used to obscure the elevated edge lights. Pipe sleeve length shall be of sufficient length to block all light output and to prevent any light leakage.

3. In extreme circumstances and with written permission of the Engineer, no more than 5% of the fixtures in each airfield lighting circuit may be unplugged from the L-830 isolation transformer secondary or have the lamp removed. If at any time a larger number of fixtures are required to be bypassed (or have the lamp removed); the L-830 isolation transformer secondary shall have a shorting device installed.

4. During runway closures the respective runway's mandatory signs shall remain operational.

5. During runway closures the respective runway's approach lighting systems (PAPI, REIL, MALSR, ALSF, etc.) shall be turned off.

6. Airfield signs providing directions to closed areas shall be covered (black out). No stray light may be emitted from the covered portions of the sign. The signs shall be covered with 3/8" thick exterior plywood panels. The plywood panels shall be painted black and shall be

banded to the sign. Please refer to the temporary airfield lighting details provided in the Contract Documents for additional requirements.

7. Areas closed to aircraft shall not be lighted (black out). The Contractor shall ensure that lighting in the closed areas cannot be inadvertently energized.

8. Adequate lighting in the opinion of the Engineer or Airport Operations shall be provided to delineate the active and closed areas of the AOA.

c. CAUTION: The series lighting circuit must always be complete before a regulator is energized. Normal circuit voltage is less than 5,000 volts; open circuit voltage can approach 10,000 volts. All personnel shall be instructed to protect the integrity of the lighting circuit. Turn off and lock out/tag out the regulator at the vault before opening the circuit. Continuity of the circuit shall be checked before the regulator is reconnected and reenergized.

d. The installation and/or removal of lighting equipment is critical to airport operations; therefore, the Contractor shall follow work schedules established in the Contract Documents or as directed by the RPR. The Contractor shall attend weekly coordination meetings with Airport Operations for the duration of the contract. The system shall be installed in accordance with applicable FAA Advisory Circulars, the National Electrical Code and/or other federal, state or local requirements.

e. The Contractor shall provide temporary wiring as required to reconnect existing circuits to provide guidance for aircraft to pass through the construction areas on those taxiways/runways, which must remain open. The Contractor shall bypass or otherwise render inoperative those portions of the runway/taxiway lighting circuits in closed areas of the airfield.

f. All runways/taxiways not closed for construction shall have fully operable airfield lighting systems using the airport airfield lighting control system. The Contractor shall coordinate the temporary airfield lighting requirements for each phase with the RPR. The Contractor shall submit a temporary airfield lighting plan to the RPR two weeks prior to the need for the temporary airfield lighting. The RPR will coordinate the plan with the airport and FAA. The Contractor shall make revisions/corrections to the temporary airfield lighting plan as required by the RPR.

g. Existing conditions may vary from the existing information shown in the Contract Documents. The Contractor's means and methods and sequence of construction within a specific phase is determined by the Contractor. Therefore, the temporary airfield lighting plan in 4.2.f above is the Contractor's responsibility. The Owner and Engineer will provide reasonable assistance to the Contractor.

h. It shall be the Contractor's responsibility to determine that all airfield lighting circuits, except those that are serving closed taxiways or runways, are fully functional, using tower controls, at the end of each work shift and shall so certify to the RPR at the end of each shift. The Contractor shall not leave the work area until the RPR has confirmed circuit operation. The certification shall be provided to the RPR at 4:00 PM and one hour before sunset. Second shift report shall report one hour before sunset. Any other shift shall report one hour prior to the need for airfield lighting or as determined by the RPR. Should bad weather cause poor visibility the RPR may require additional status reports of system operability and may call for the operation of the airfield lighting system at any time. In the event of airfield lighting system failure, the

Contractor shall immediately take the necessary steps to restore proper operation of the airfield lighting system.

i. During runway closures the respective runway's mandatory signs shall remain operational.

j. It shall be the Contractor's responsibility to determine that all airfield lighting and signage circuits serving closed taxiways or runways (except runway mandatory signs) are turned off, bypassed as previously described or completely obscured at the end of each work shift and shall so certify to the RPR at the end of each shift. The Contractor shall not leave the work area until the RPR has confirmed the closed area is properly blacked out.

k. The Contractor shall check the status of the temporary airfield lighting/signage and black out equipment on a daily basis. The Contractor shall provide temporary airfield lighting/signage and black out maintenance and support on a 24 hour a day, seven days a week basis for the duration of the project. The RPR shall be provided contact names and phone numbers for two persons (one as primary, one as backup) to provide maintenance or to meet temporary airfield lighting/signage and black out needs during off hours. The designated person shall respond onsite within one hour of initial contact.

l. Whenever the scope of work requires connection to an existing circuit, or should the scope of work involve working adjacent to or near an existing circuit, and the work could have any impact on the existing circuit, the circuit's insulation resistance shall be tested, in the presence of the RPR. The test shall be performed in accordance with Item SP-111 and prior to any activity affecting or impacting the respective circuit. The Contractor shall record the results on forms included in SP-111. When the work affecting the circuit is complete (or at end of shift prior to energization), the circuit's insulation resistance shall be checked again, in the presence of the RPR. The Contractor shall record the results on forms included in SP-111. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the circuit to bring the second reading above the first reading. All repair costs including a complete replacement of the L-823 connectors, L-830 transformers and L-824 cable, if necessary, shall be borne by the Contractor. The Contractor shall measure and record the insulation resistance of **ALL** airfield lighting circuits prior to starting any work. All test results shall be submitted in the Operation and Maintenance (O&M) Manual.

m. Should the Contractor fail to perform the tests prior to starting work, the Contractor shall be responsible to bring the impacted circuits to a minimum 50 megohm insulation resistance value or higher value in conformance with any previous airport test records.

n. Provide temporary wiring to permit operation of lighting circuits associated with each phase of construction. Temporary cable connections shall be made in airfield lighting circuits when permanent wiring cannot be completed during daylight hours.

o. The Contractor shall furnish, install and maintain hazard marking and lighting to identify closure areas, open manholes, small areas under repair, stockpiles, and other construction related areas hazardous to aircraft or personnel.

p. The Contractor is responsible for operating all temporary circuits within their rated capacity.

q. The cost of temporary and reconnected airfield lighting/power shall be considered incidental to the pay items provided within the Contract Documents.

104-4.3 TEMPORARY ELECTRICAL AND LIGHTING INSTALLATION:

a. Temporary electrical and/or lighting fixtures shall be provided in operational areas of buildings where required to maintain public safety and continued airport operations.

b. Provide temporary roadway lighting on airport roads and detours during construction. Design installation and removal of temporary systems shall be the responsibility of the Contractor. Light levels shall be 1.0 maintained foot-candles on the traveled part of the roadway. Lighting under the bridges during construction shall have a metal halide or other white light source, providing a maintained light level of 2.0 foot-candles. Maximum to minimum uniformity ratios shall be 10:1.

c. Temporary lighting must be installed to ANSI/OSHA standards for impacted area. Light levels shall also meet the requirements of the Illuminating Engineering Society for the type of task being performed.

d. Temporary installations shall comply with the NEC and shall be acceptable to the Owner, RPR or authorized representative.

e. The cost of temporary and reconnected area/building lighting/power shall be considered incidental to the pay items provided within the Contract Documents.

104-4.4 MISCELLANEOUS REGULATIONS:

a. Electrical main distribution panels, branch circuits panels, control panels, etc., may have their front covers removed for access to live parts. Access to live parts shall be guarded/barricaded in accordance with NFPA 70E.

b. Draw-out type breakers, regardless of operating voltage must be drawn completely out to open position and tagged and locked out per 104-4.1.

c. In hazardous locations, regardless of class, all electrical tools and extension cords shall be of a type accepted for use in such areas.

d. No counterpoise/grounding conductors may be joined, connected, or affixed to any terminal, grounding electrode, or other point of attachment by any method except exothermic welding, or accepted equivalent. See Item L-108.

e. All counterpoise or grounding systems, when damaged, shall be immediately reported to the RPR. Once the repair/replace procedure has been accepted by the RPR the Contractor shall immediately repair/replace the counterpoise or grounding components.

f. No high voltage switch shall be engaged or disengaged under load.

g. All backhoes, cranes, etc., shall be enclosed by safety pylon or other markers and rope festooned by accepted safety tapes.

h. All security gates in use by Contractors are the responsibility of the Contractor and must be used in a fully secure manner. Any damage to a security gate shall be reported immediately to the RPR.

104-4.5 TEMPORARY COMMUNICATIONS/CONTROL:

a. Temporary communication and control systems shall be provided in operational areas of buildings where required to maintain public safety and continued airport operations. Temporary communication and control systems shall be as described in the Contract Documents.

b. The cost of temporary and reconnected communication and control shall be considered incidental to the pay items provided within the Contract Documents.

METHOD OF MEASUREMENT

104-5.1 METHOD OF MEASUREMENT:

a. Except for the two pay items described below all other items shall be considered incidental to other items and shall be included with its applicable system.

b. Temporary Power & Temporary Airfield Lighting/Signage/Navigational Facilities shall be measured as a lump sum item.

BASIS OF PAYMENT

104-6.1 BASIS OF PAYMENT:

a. Except for the two pay items, as described below, no direct payment shall be made for the work described in this section. The work described in this section is incidental to other items and shall be paid for the respective bid item of which it is a component part.

b. Temporary Power & Temporary Airfield Lighting/Signage/Navigational Facilities payment shall be made at the contract lump sum price for the required work. This item shall include all testing, troubleshooting, maintenance and other consequential work required to maintain the temporary power, and temporary airfield lighting, signage, and Navigational Facilities as impacted by this Contract. This price shall be full compensation for all planning, supervision, furnishing all material, labor, transportation, services, equipment, utility company fees and for all preparation, removal of the temporary materials and equipment and for all labor, equipment, tools and all incidentals required to furnish and install Temporary Power and Temporary Airfield Lighting, Signage, and Navigational Facilities in accordance with the Contract Documents. This item includes all excavation, backfill, cable, conduit and other materials and appurtenances necessary to complete these items.

Payment will be made under:

Item SP-104-1	**Temporary Power & Temporary Airfield Lighting/Signage/Navigational Facilities**	**-- Lump Sum (LS)**

END OF ITEM SP-104

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ITEM SP-105 ALTERATIONS, REMOVAL AND DEMOLITION

PART 1 – GENERAL

105-1.1 GENERAL:

A. This item shall apply to all electrical work contained within the Contract Documents. Where the contract general conditions, special provisions or other parts of the Contract Documents also apply, the stricter of the documents shall govern.

B. Alterations shall mean any change or rearrangement in the component parts, including structural, mechanical, and electrical systems, or internal or external arrangements of an existing item, component, system or structure.

C. Removal shall mean the dismantling and disposal of existing materials, components, equipment, and utilities. Removed items shall be handled, prepared for storage, transported to storage areas, or disposed of as specified.

D. Demolition shall mean abandonment, removal and disposal, or salvage and delivery to the Owner as required by the Contract Documents.

E. The installation and/or removal of lighting equipment may be critical to airport operations; therefore, the Contractor shall follow work schedule established in the Contract Documents or as directed by the Engineer.

F. Temporary power and lighting shall be accomplished in accordance with the Contract Documents.

105-1.2 CONDITION OF EXISTING FACILITIES:

A. The Contractor shall verify the areas, conditions, and features necessary to tie into existing construction. This verification shall be done prior to submittal of shop drawings, fabrication or erection, construction or installation. The Contractor shall be responsible for the accurate tie-in of the new work to existing facilities.

B. The Contractor shall protect all existing utilities from damage resulting from alteration, removal and demolition activities.

C. Any hazardous waste issue shall be immediately reported to the Engineer.

D. Whenever the scope of work requires, connection to an existing circuit, or should the scope of work involve working adjacent or near to an existing circuit and the work could have an adverse impact on the existing circuit, the circuit's insulation resistance shall be tested, in the presence of the Engineer. The test shall be performed in accordance with Item SP-111 and prior to any activity affecting or impacting the respective circuit. The Contractor shall record the results on forms included in Item SP-111. When the work affecting the circuit is complete (or at end of shift prior to energization), the circuit's insulation resistance shall be checked again, in the presence of the Engineer. The Contractor shall record the results on forms included in Item SP-111. The second reading shall be equal to or greater than the first reading

or the Contractor shall make the necessary repairs to the circuit to bring the second reading above the first reading. All repair costs including a complete replacement of the L-823 connectors, L-830 transformers and L-824 cable, if necessary, shall be borne by the Contractor. The Contractor shall measure and record the insulation resistance of **ALL** airfield lighting circuits prior to starting any work. All test results shall be submitted in the Operation and Maintenance (O&M) Manual.

E. Should the Contractor fail to perform the insulation resistance tests prior to starting work, the Contractor shall be responsible to bring the impacted circuits to a minimum 50 megohm earth resistance value or higher value in conformance with any previous airport test records.

105-1.3 OCCUPANCY AND USE OF EXISTING FACILITIES:

A. The Owner will occupy and use the facilities within the areas of work during the entire construction period. The Contractor shall be required to plan and coordinate the Contractor's activities in order to provide all necessary controls for the abatement of dust, noise, and inconvenience to Owner personnel during all phases of the work.

105-1.4 VACATING OCCUPIED AREAS:

A. The Owner will remove all portable items of furniture, equipment, and fixtures prior to the start of work.

105-1.5 SAFETY REQUIREMENTS:

A. The Contractor shall conduct all operations in a manner that will ensure the safety of persons and property in accordance with the OSHA requirements of CFR 29 Part 1926/1910.

B. The Contractor shall comply with the Airport Maintenance Department's LOCK OUT/TAG OUT (LOTO) procedure and NFPA 70E.

105-1.6 CLASSIFICATION OF REMOVED ITEMS:

A. Existing materials and equipment indicated to be removed will be classified as "salvageable" and shall remain the property of the Owner or will be classified as "demolition or debris" and shall be legally disposed.

B. Salvageable Items:

1. Salvaged materials and equipment shall be reused in the work only in construction of temporary electrical facilities, unless noted otherwise.

2. Properly box, protect and ready for transport salvageable items. Retained salvaged items shall be stored on Owner property.

3. Salvaged materials and equipment to be retained by the Owner but not reused in the work shall be turned over to the Owner at a site at the facility to be determined by the Owner.

4. Airfield lighting fixtures, signs and isolation transformers designated to be removed and reinstalled by the Contractor shall be stored indoors in a conditioned space. The indoor conditioned space shall be provided by the Contractor and considered incidental to the pay items provided. As each item designated for removal and reinstallation is removed the Contractor and Engineer shall immediately inspect the item for appropriateness for reinstallation. Any damage not reported in writing to the Engineer within two hours of removal shall become the Contractor's responsibility for replacement/repair of the material as directed by the Engineer. The Contractor is asked to pay special attention to the protection of the semiflush fixture leads. The semiflush fixture lead insulation is easily damaged which results in water infiltration into the fixture.

C. Demolition or Debris:

1. Items classified as demolition or debris shall be legally disposed of off the Owner's property. The cost of such disposal shall be included in the bid price.

105-1.7 TEMPORARY PROTECTION:

A. Contractor shall protect persons and property throughout the progress of the work in accordance with the Contract Documents.

105-1.8 DEMOLITION TASK PLAN AND SCHEDULE:

A. The Contractor shall submit to the Engineer a Demolition Task Plan and Schedule for all existing utility relocation(s) and demolition work. The task plan shall be submitted within 30 days of notice to proceed but no later than 30 days prior to the start of the relocation/demolition work.

B. The task plan and schedule shall detail the phasing of the utility relocation(s) and demolition activities with the balance of the project phasing plan. The task plan and schedule shall detail the Contractor's plan for protection of the existing utilities.

C. The task plan and schedule shall demonstrate preliminary coordination has taken place with the FAA, Airport, communications and power utilities and also demonstrates compliance with the Contract Documents.

D. No work shall be initiated until the task plan and schedule has been submitted to the Engineer and accepted by the utilities. No demolition, alteration or relocation work shall be started until the permanent work replacing the demolition, alteration or relocation is complete, in place, accepted and ready for operation; or until other temporary means have been approved and accepted by the Engineer.

PART 2 - EXECUTION

105-2.1 DISCONNECTING UTILITIES:

A. Prior to the start of work, the Contractor shall coordinate with the Owner and effected utility companies to have each utility placed in a safe work condition.

B. Each utility effected shall be locked out and tagged by the Contractor. Proper safety grounds or equivalent shall be placed for personnel protection.

105-2.2 TEMPORARY UTILITY SERVICES:

A. Contractor shall install temporary utility services in satisfactory operating condition before disconnecting existing utilities. Such temporary services shall be maintained during the period of construction and removed only after new permanent services have been tested and are in operation. Please refer to Item SP-104.

105-2.3 REMOVAL WORK:

A. The Contractor shall not disturb the existing construction beyond that indicated or necessary for installation of new work. Temporary shoring and bracing for support of building components to prevent settlement or other movement shall be as required to protect the work and existing facilities.

B. The Contractor shall provide protective measures to control accumulation and migration of dust and dirt in all areas of work, particularly those adjacent to occupied areas. The Contractor shall remove dust, dirt, and debris from the areas of work daily.

105-2.4 SALVAGEABLE MATERIALS AND EQUIPMENT:

A. The Contractor shall remove all salvageable materials and equipment in a manner that will cause the least possible damage thereto. Salvageable items, which are to be retained by the Owner, shall be carefully handled, stored, and protected.

B. The Contractor shall provide identification tags on all salvageable items boxed or placed in containers, indicating the type, size, and quantity of materials.

C. The Contractor shall exercise extreme care when removing airfield lighting bolting hardware. The existing bolting hardware may have been installed in excess of twenty-five years. The Contractor shall be responsible for the proper removal/repair/replacement of all stripped/broken/damaged fixture bolts or light base bolts or tapped holes in light bases and/or appurtenances encountered during construction. Contractor shall use drilling/tapping/inserts fixture/jigs/tooling and methods approved by the light base manufacturer or an accepted equivalent. Payment for this work shall be considered incidental to the respective fixture and light base pay items provided in the Contract Documents.

105-2.5 BUILDINGS AND STRUCTURES:

A. The Contractor shall perform removal operations in existing areas/buildings/structures as indicated and as otherwise required to complete the work.

B. Existing concrete shall be demolished, removed, and disposed. Square, straight edges shall be provided where existing concrete adjoins new work and at other locations where indicated. Existing steel reinforcement shall be protected where indicated; otherwise, it shall be cut off flush with face of concrete.

C. The Contractor shall dismantle structural steel components at field connections and in a manner that will prevent bending or damage.

D. The use of flame-cutting torches will be permitted only when other methods of dismantling are not practical, and when approved in writing by the Engineer.

105-2.6 ELECTRICAL EQUIPMENT AND FIXTURES:

A. Wiring systems and components shall be salvaged. Loose items shall be boxed and tagged for identification.

B. Primary, secondary, control, communication, and signal circuits shall be disconnected at the point of attachment to their distribution system.

C. The Contractor shall remove and salvage electrical fixtures. Incandescent lamps, mercury-vapor lamps, and fluorescent lamps shall be salvaged, boxed and tagged for identification, and protected from breakage. The fixtures shall be turned over to the Owners Maintenance Department. This Contractor shall legally dispose of concrete bases, etc. off the Airport property.

D. The Contractor shall remove and salvage switches, receptacles, fixtures, transformers, regulators, meters, instruments, cover plates, circuit breakers, panelboards, outlet boxes, and similar items; these items shall be boxed, and tagged for identification according to type and size.

E. The Contractor shall remove and salvage cable tray, wiring ducts and troughs.

F. The Contractor shall remove and dispose of conductors, including insulated wire, nonmetallic sheathed and flexible armored cable.

G. All removed or demolished items not identified for reuse in the work or to be turned over to the Owner, unless noted otherwise, shall be properly and legally disposed of off the airport site.

105-2.7 DEMOLITION OPERATIONS:

A. Demolition operations shall be conducted to ensure the safe passage of persons to and from facilities occupied and used by the Owner.

B. The sequence of operations shall be such that maximum protection from inclement weather will be provided for materials and equipment in partially dismantled state.

105-2.8 MAINTAINING TRAFFIC:

A. Demolition operations and removal of debris to disposal areas shall be conducted to ensure minimum interference with roads, streets, walks, and other facilities occupied and used by the Owner.

B. Streets, walks, runways, taxiways and other facilities occupied and used by the Owner shall not be closed or obstructed without written permission.

105-2.9 UTILITY ADJUSTMENTS:

A. The Contractor shall adjust utility elevations and or locations as described in the Contract Documents.

PART 3 – DISPOSAL OF REMOVED/DEMOLISHED MATERIALS

105-3.1 GENERAL:

A. The Contractor shall dispose of debris, rubbish, scrap, and other non-salvageable materials resulting from demolition/removal operations. Removed/demolished materials shall not be stored or disposed of on the project site.

B. Removed/demolished materials shall be properly and legally disposed of off airport property.

C. Removed/demolished debris shall be transported from Owner property and legally disposed at no additional cost to the Owner. The Contractor shall pay permits and fees for disposal.

105-3.2 RACEWAY DEMOLITION:

A. Pull wire out of existing raceways. Underground conduit/duct may be abandoned in place when not in an area of excavation. When abandoned in place install waterproof caps/plugs and concrete end of duct markers.

B. Raceways that interfere with new work shall be completely removed.

C. Install 200 pound test pull rope in all conduits/ducts to remain in place. Conduit/duct banks may be abandoned in place if they are not within 24” of any new subgrade material.

D. Dispose of raceway as debris.

105-3.3 AIRFIELD LIGHTING AND SIGNS:

A. Carefully remove existing airfield lighting, signs, etc. as noted in the Contract Documents. Properly store all signs, fixtures, base plates and spacer rings for reinstallation or turn over to Owner as noted in the Contract Documents.

B. There may be concrete foundations (anchors) around light bases that extend into the existing asphalt surface as well as concrete backfilled trenches, conduits and duct banks within the asphalt paved areas that may be encountered during the required milling process. To the extent known, these duct banks and conduits are shown on the Contract Documents under/within the paved areas. The milling of any such concrete around the light bases, or over trenches, ducts and conduits shall be considered incidental to the milling pay item.

C. Existing concrete sign pads, light bases, and raceways shall be demolished, transported from Owner property and legally disposed.

D. If required by the Contract Documents reinstall signs and fixtures.

E. Turn over to the Owner all signs, fixtures, base plates and spacer rings not reinstalled as a part of this contract.

F. Remove existing light bases, L-824 cable, L-830 isolation transformers and associated foundations and legally dispose.

105-3.4 MANHOLE/HAND HOLE DEMOLITION:

A. Manholes, hand holes, pull boxes, etc. shall be removed and disposed of as demolition debris.

B. Demolished manholes, hand holes, pull boxes, etc. below the new full strength pavement shall be completely removed.

C. Demolished manholes, hand holes, pull boxes, etc. below shoulder pavement or in turfed areas shall be cut down to a depth of 48” min. below finished grade, filled and compacted in accordance with the Contract Documents.

105-3.5 GENERAL – CUTTING AND PATCHING:

A. Cutting, patching, repairing, and other alteration work shall be done by mechanics skilled in the particular trade or work required.

B. Salvaged items for reuse shall be as accepted by the Engineer.

C. Where required to patch or extend existing construction, or both, such alteration work shall match existing exposed surface materials in finish, color, texture, and pattern.

105-3.6 UTILITY ADJUSTMENTS:

A. The Contractor shall provide for all materials, labor, transportation, supervision, services and all incidentals required to adjust the elevation of existing electrical, communication and fiber optic utilities as shown in the Contract Documents. This work shall include hand excavation for the entire length of the utility adjustment described in the Contract Documents and if required the excavation of an additional 250 linear feet on each side of the area shown for adjustment within the Contract Documents. This item includes all concrete, rebar, excavation, forming, backfill, sod, restoration etc., and all materials and appurtenances not specifically identified, but necessary to complete the adjustment to the elevation of an existing utility in accordance with the Contract Documents.

105-3.7 REQUIRED DEMOLITION OF UNFORESEEN CONDITIONS:

A. During the course of construction, unforeseen or unanticipated abandoned electrical bases, structures or components (items) remaining from previous construction and for which no record was available or for which no field observation can confirm, may be uncovered. The items may be constructed of reinforced concrete, steel or other durable materials. These items may be under the ground surface or may be discovered during the milling process. An example of such a structure would be an old military concrete light base remaining from a previous project, located under shoulder pavement that requires full depth removal. These

items are over and above the items shown on the Existing Condition and Demolition drawings which denote demolition. This work shall provide for the removal of the item, backfill and restoration of the surrounding excavation or disturbed areas caused by the removal of the item. The Engineer shall make the final determination if the item in question is unforeseen or unanticipated. The Engineer may adjust the Contract Documents to relocate the new design element to avoid the conflict with the unforeseen or unanticipated item.

PART 4 - METHOD OF MEASUREMENT

105-4.1 METHOD OF MEASUREMENT:

A. All Electrical Demolition covered by this item will be paid for at the contract lump sum price, as set forth below, for demolition, alteration and removal complete and in accordance with the Contract Documents.

B. All utility elevation adjustments work covered by this item will be paid for at the contract lump sum price, as set forth below for utility elevation adjustments, complete and in accordance with the Contract Documents and accepted and ready for operation.

C. L-867 and L-868 light bases, not currently designated for demolition/removal, but required to be removed to support paving operations shall be measured by each unit removed, completed and accepted. No separate measurement will be made for the various types and sizes. The Engineer shall designate, as construction progresses which additional light bases are required to be removed to support milling/paving operations.

D. Demolition of unforeseen or unanticipated items shall be measured by the entire item removal, backfill, and restoration, completed, and accepted. Separate measurement will be made for the various types and sizes. Items 250 cubic feet and larger in size shall be paid for in multiples of the two pay items provided. The multiples selected for the oversized unforeseen or unanticipated items shall be those most advantageous to the Owner.

PART 5 - BASIS OF PAYMENT

105-5.1 BASIS OF PAYMENT:

A. Payment will be made at the contract lump sum price for the required demolition, alteration and removal. This price shall be full compensation for furnishing all material, equipment and for all preparation, removal of the demolished materials and equipment and for all materials, labor, equipment, tools, services and incidentals necessary or required for the electrical demolition as shown in the Contract Documents. It is the intent of the demolition pay item that all equipment, devices, raceway, pull boxes, manholes, fixtures, wiring, materials, systems, appurtenances, etc., which are no longer required as a result of the project be removed. All waste materials shall be removed from the airport property and legally disposed of by the Contractor. This item includes all backfill, P-610, sod and other materials and appurtenances not specifically identified, but necessary to complete these items in accordance with the Contract Documents.

B. Payment will be made at the contract lump sum price for the required utility elevation adjustments. This price shall be full compensation for furnishing all material,

equipment and for all preparation, removal of the demolished materials and equipment and for all labor, equipment, tools and incidentals necessary to complete this item. This item includes all materials, labor, transportation, incidentals and services required for the lowering of the existing conduit/duct and cable between manhole EMH-10 and the FAA manhole as shown in the Contract Documents. It is the intent of this pay item that all materials and appurtenances not specifically identified, but necessary to complete the adjustment of the elevation of an existing utility in accordance with the Contract Documents and to the satisfaction of the Utility/Engineer is included. This item includes all backfill, P-610, sod, restoration and other materials and appurtenances necessary to complete these items in accordance with the Contract Documents.

C. Payment shall be made at the contract unit price for each additional L-867 or L-868 light base not currently designated on the plans for removal/demolition that is required to be removed. The Contractor shall include in the bid price the necessary hand work required to work around light bases designated to remain in place. Included in this pay item is the uncovering and preparation for extension of the existing raceway and counterpoise connected to the exiting light base. The Engineer shall designate which additional light bases (if any) warrant removal to support milling/paving operations. Additional light bases shall be cored out; alternate method of removal shall be subject to the Engineer's acceptance. This item includes all materials, supervision, labor, transportation, incidentals and services required for the demolition and coring out of additionally designated existing light bases from existing asphalt or concrete pavement in support of the installation of a new light base and fixture. The Engineer shall make final determination if an additional light base shall be removed or if additional handwork is required to complete the item under the respective pay item furnished.

D. Payment shall be made at the contract unit price for each unforeseen or unanticipated item requiring demolition not specified or shown on the Contract Documents and approved by the Engineer. This item includes all materials, supervision, labor, transportation, incidentals and services required for the demolition and restoration of the unforeseen or unanticipated item. The Engineer shall make the final determination if the item in question is unforeseen or unanticipated.

Payment will be made under:

Item SP-105-1 Electrical Demolition -- Lump Sum (LS)

END OF ITEM SP-105

ITEM SP-106 SUBMITTALS, RECORD DOCUMENTS AND MAINTENANCE MANUALS

PART 1 – DESCRIPTION

106-1.1 GENERAL:

A. The items described in this item are applicable to all electrical work. Electrical work is defined as any work described, included, depicted or contained within the Construction Specifications Institute (CSI) Division 16, 26, 27, 28, 33 or 34 specifications, L-XXX specification series, L- series drawings, E- series drawings, ED- series drawings and all other work within the Contract Documents dealing with the distribution of electrical power/light, electrical/electronic/light monitoring, communication and control.

B. Only Third Party Certified manufacturers, listed in AC 150/5345-53, Appendix 3 Addendum (as required) and meeting the BUY AMERICAN preference requirements can provide equipment and materials specified in the Contract Documents. Documentation certifying compliance with the BUY AMERICAN preference rules for AIP (in accordance with Title 49, United State Code [USC], 1990; later designated as 49 USC §50101) shall be included with each equipment and material submittal.

C. The requirements for submittals, record drawings and Operation and Maintenance (O&M) Manuals supplement the requirements and are in addition to the requirements of the general conditions, special provisions or other parts of the Contract Documents. Where the contract general conditions, special provisions or other parts of the Contract Documents also apply, the stricter of the documents shall govern.

106-1.2 SCOPE:

A. This item includes the requirements for submittals, record documents and operation and maintenance (O&M) manuals. All submittals and O & M Manuals shall be submitted in book form as described by this item.

PART 2 – REQUIREMENTS FOR SUBMITTALS

106-2.1 DATA, SHOP DRAWINGS AND SAMPLES:

A. Shop drawings are drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are prepared by the Contractor or any subcontractor, manufacturer, supplier or distributor, and which illustrate some portion of the work.

B. Submittal data for electrical materials and equipment shall consist of shop drawings and/or catalog cuts showing technical data as necessary to evaluate the material or equipment, to include dimensions, wiring diagrams, performance curves, ratings, control sequence and other descriptive data necessary to describe fully the item proposed and its operating characteristics.

C. Prior to the installation of any material or equipment and **within 30 days of notice to proceed**, the Contractor shall provide to the Engineer all submittals as required by the Contract Documents. The submittals shall be complete and made in **ONE** submission in the

format required by this item. Partial submission will only be considered under special circumstances.

D. The Contractor shall perform no portion of the work, nor purchase any materials, requiring submission until the Engineer has accepted the relevant submittal/shop drawing/sample. Should the Contractor commence any work or install any materials prior to the receipt of an accepted submittal/shop drawing/sample the Contractor is deemed to be proceeding at the Contractor's own risk.

E. Samples are physical examples furnished by the Contractor to illustrate materials, equipment or workmanship, and to establish standards by which the work will be judged. Each sample shall be accompanied by the manufacturer's instructions regarding installation, operation and maintenance and shall be identified by item number, and specification.

F. By approving and submitting Shop Drawings and Samples, the Contractor thereby represents that the Contractor has determined and verified all field measurements, field construction criteria, materials, catalog numbers and similar data and that the Contractor, has checked and coordinated each Shop Drawing and Sample with the requirements of the work of the Contract Documents.

G. Unless otherwise stated in the Contract Documents the Engineer will review Data, Shop Drawings and Samples within thirty (30) days after receipt, but only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. The Engineer's review of a separate item shall not indicate approval of an assembly in which the item functions.

H. The Engineer reserves the right to reject any and all equipment, materials and procedures, which, in the Engineer's opinion, does not comply with the system design and the standards and codes specified herein.

I. The Engineer shall be the sole judge of whether the proposed "acceptable equivalent" is suitable for use in the work.

J. The Contractor shall make any corrections required by the Engineer and shall resubmit the required number of corrected shop drawings or new samples until accepted. The Contractor shall direct specific attention in writing on resubmitted shop drawings to revisions other than the corrections requested by the Engineer on previous submissions.

K. If the Contractor desires to substitute materials or deviate from the requirements of the Contract Documents, the Contractor shall separately submit all substitute materials and deviations to the Contract Documents. Such submittals shall be clearly and boldly marked "**SUBSTITUTION"** or **"DEVIATION TO CONTRACT DOCUMENTS"**. If the substitution or deviation is accepted, the Contractor will not be excused from producing work in conformity with the Contract Documents. If a trial use establishes the work does not comply with the Contract Documents, the Contractor shall take such action as the Engineer determines necessary.

L. The Engineer's approval of shop drawings or samples shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents unless the Contractor has informed the Engineer in writing of such deviation at the time of submission and the Engineer has provided written acceptance to the specific deviation. The

Engineer's approval shall not relieve the Contractor from responsibility for errors or omissions in the shop drawings or samples.

M. The submittals will be checked only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Any action noted by the Engineer on the submittal is subject to the requirements of the Contract Documents.

N. The Contractor is responsible for dimensions, quantities, fabrication processes and methods of construction, coordination of the Contractors work with that of all trades. The Contractor shall be responsible for satisfactory performance of the Contractor's work and supplying a complete and fully functional system. The Contractor shall confirm and correlate dimensions at the jobsite.

O. Samples shall be submitted upon request or as required by the Contract Documents.

P. The Contractor shall maintain an accurate updated "SUBMITTAL REGISTER" containing the status of all submittals. The log shall be updated on a weekly basis. The Contractor shall bring the submittal register to each progress meeting. The submittal register shall contain the following information:

1. Submittal description and number assigned.

2. Contract Document required submittal date.

3. Submittal electrical system type; airfield lighting or airfield lighting control or airfield lighting vault power system.

4. Reference Item # (L-108, 26 05 33.13, etc).

5. Date sent to Engineer.

6. Date returned to Contractor from Engineer.

7. Submittal status.

8. Date of resubmittal and return – as applicable.

9. Date material released for fabrication.

10. Projected date of fabrication.

11. Projected date of delivery to site.

106-2.2 ELECTRONIC SUBMITTAL:

A. Electronic submittal shall consist of a single PDF document separated and book marked per each electrical system, per specification section as described in section 106-2.2.d. containing all materials for each item to be installed in the project.

B. Electronic submittals larger than 10 megabyte shall be separated into smaller PDF files for transmission to make up a single PDF document. Each separate PDF shall be book marked per specification section containing all materials for each item to be installed in the project.

C. Each PDF for electronic transmission shall be clearly labeled as transmittal X of Y per submittal section.

D. Provide separate submittal PDF's for each of the following electrical system types:

1. One PDF submittal set for the Airfield Lighting System. All components to be included in the contract for lighting, conduit, grounding and miscellaneous systems shall be included.

2. One PDF submittal set for the Airfield Lighting Control System.

3. One PDF submittal set for the Airfield Lighting Vault Modifications,

106-2.3 SUBMITTAL CONTENTS:

A. First sheet(s) in shall be a cover sheet containing the project information and location. See appendix A at the end of SP-106 specification.

B. The second sheet shall be a table of contents identifying the specification section(s) being submitted.

C. Third sheet shall be prepared and filled out by Contractor and shall list project address of airport, Engineer, Contractor & subcontractor(s).

D. Fourth sheet shall also be filled out by Contractor and list project schedule information.

E. Submittals consisting of marked catalog sheets or shop drawings shall be inserted in the PDF in specification number/section order. Submittal data shall be presented in a clear and thorough manner. **Original PDF catalog sheets are preferred. Scans of catalog sheets are acceptable provided they are equivalent in quality to the original document.**

F. Clearly and boldly mark each page to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. **Markings shall be boldly and clearly made with arrows or circles (highlighting is not acceptable).**

G. All sheets within the submittal shall be oriented in a portrait setting. Mixing of portrait and landscape oriented standard 8.5 X 11 sheets shall not be permitted.

H. All sheets contained within the PDF shall be straight. Sheets scanned on a drastic angle making the submittal page difficult to read shall not be permitted and shall result in the submittal being rejected.

I. Some catalog sheets have colored backgrounds or colored text. When scanned these items appear black and obscure the printed text and markings by the contractor. For this reason all scans of sheets with colored backgrounds or text shall be made in color. Sheets that are not readable due to obscured information shall be rejected.

J. Submittals for components of electrical equipment and systems shall identify the equipment for which they are a component part on each submittal sheet.

K. Shop Drawings: Drawings to include identification of project and names of Engineer(s), General Contractor, subcontractor and supplier, data, number sequentially and indicate the following:

1. Fabrication and erection dimensions.

2. Arrangements and sectional views.

3. Necessary details, including complete information for making connections with other work.

4. Kinds of materials and finishes.

5. Descriptive names of equipment.

6. Modifications and options to standard equipment required by the work.

7. Leave blank area, size approximately 5 x 5 inches, near title block for the Engineer’s stamp imprint.

8. Point-to-point wiring diagrams.

9. Conduit/duct/raceway rough-in drawings.

10. See specific items of the Contract Documents for further requirements.

L. Submittal Product Data - Technical data is required for all items as called for in the Contract Documents regardless if item furnished is as specified.

1. Submit technical data verifying that the item submitted complies with the requirements of the Contract Documents. Technical data shall include manufacturer's name and model number, dimensions, weights, electrical characteristics, and clearances required. Indicate all optional equipment and changes from the standard item as called for in the Contract Documents. Furnish drawings, or diagrams, dimensioned and in correct scale, covering equipment, showing arrangement of components and overall coordination.

2. In order to facilitate review of product data, insofar as practicable, they shall be noted, indicating by cross reference the Contract Documents, note, drawing number and/or specification number and item paragraph numbers where item(s) occur in the Contract Documents.

3. See specific items in Contract Documents for further requirements.

106-2.4 PROCESSING SUBMITTALS:

A. Submit the PDF submittal and shop drawings per Specification section

B. The Contractor shall review, stamp with the Contractor's approval and submit to the Engineer, eight (8) prints of shop drawings, eight (8) copies of submittal books and three (3) sets of samples where required, as described in this item,

C. The General Contractor shall review the submittal books before submitting to the Engineer. No request for payment will be considered until the submittal book has been reviewed and submitted for review by the Engineer.

D. Product Data: For standard manufactured materials, products and items, submit one (1) copy or sets of data (per book).

E. Shop Drawings for custom fabricated items and systems:

1. Initially submit a transparency (suitable for reproduction) together with four (4) prints made the transparency.

2. When submittal is acceptable, furnish one (1) print per book made from the accepted transparency.

F. Acceptance: When returned to Contractor, the front of each submittal will be marked with the Engineer's stamp. If box marked "Submit Specified Item", or "Rejected" or "Revise and Resubmit" is checked, submittal is not accepted and Contractor is to correct and resubmit as noted. If submittal is marked "Make Correction Noted" Contractor may begin construction utilizing the submitted item with corrections made. **However, the corrected submittal must be resubmitted for record keeping purposes.** Contractor is to comply with notation making necessary corrections on submittal and resubmit for final record.

G. If the submittal is marked "No Exception Taken" the Engineer took no exceptions to the submitted items.

H. Corrections or comments made on the shop drawings during this review do not relieve Contractor from compliance with requirements of the Contract Documents. This check is only for review of the general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. The Contractor is responsible for; confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating the Contractor's work with that of all other trades and performing all work in a safe and satisfactory manner.

I. Note that the acceptance of shop drawings or other information submitted in accordance with the requirements contained in this item, does not assure that the Engineer or any other Owner's Representative attests:

1. To the dimensional accuracy or dimensional suitability of the material or equipment involved.

2. The ability of the material or equipment involved to perform as designed.

3. The mechanical or electrical performance of equipment.

J. Approval of shop drawings does not invalidate the Contract Documents if in conflict; unless a letter requesting such a change is submitted and accepted on the Engineer's letterhead.

106-2.5 DELAYS:

A. Contractor is responsible for delays in job progress accruing directly or indirectly from late submissions or resubmissions of shop drawings, or product data.

106-2.6 RE-SUBMITTALS:

A. The Engineer shall be reimbursed for engineering costs to review resubmittals subsequent to the second submittal.

PART 3 – RECORD DOCUMENTS

106-3.1 PROGRESS AND RECORD DRAWINGS:

A. Keep two sets of blue line prints on the job and neatly mark up design drawings each day as components are installed. **Red pencil shall be used for additions and green pencil for deletions. Use of "white out" or similar products is not permitted.**

B. All items on record drawings shall be shown in actual location installed. Drawings shall be inspected weekly, by the Engineer, for compliance and accuracy. Project payments shall be withheld if the marked-up drawings are not current.

C. Change the equipment schedules to agree with items actually furnished.

D. All hand holes, pull boxes, junction can plazas, manholes, underground ducts, conduits, force mains, drains, ground grids, etc. (all underground utilities) installed by this Contractor or located by this Contractor during the construction of this project shall be surveyed and recorded on the record documents. Record utility locations in state plane grid coordinates. Provide north-south, east-west coordinate and elevation.

E. At the end of the project, all changes shall be reviewed by the Electrical Contractor. The drawings shall be marked "As Built" and dated and signed by the Electrical Contractor's Superintendent.

F. Prior to request for final payment, furnish a set of "As Built" prints to the Engineer for review. The final prints shall be professionally drafted to indicate "As Built" conditions to the Engineer. The prints shall be stamped "As Built" signed and dated by the Contractor. The Contractor's signature shall certify to the Engineer that the "As Built" drawings are accurate and complete.

G. The Contractor's failure to produce representative "As Built" drawings in accordance with requirements of this item, shall be cause for the Engineer to produce such "As-built" drawings and the Contractor shall reimburse Engineer for all costs to produce a representative set of "As Built" drawings.

PART 4 – OPERATION AND MAINTENANCE MANUALS

106-4.1 REQUIREMENTS FOR OPERATION AND MAINTENANCE MANUALS:

A. Two (2) CD's shall be provided with all O & M Manual information included in PDF format. The Operation and Maintenance Manual shall be submitted as a PDF document. As a minimum, the Operation and Maintenance Manual shall contain the following:

1. Safety precautions used while maintaining the equipment.

2. Theory of circuit and system operation.

3. Complete schematic and interconnecting wiring diagrams.

4. Complete parts list with each circuit component keyed to designations assigned on schematics and wiring diagrams. Complete information shall be given for each part to permit ordering for replacement purposes. This information shall include the components rating, name of manufacturer and the manufacturer's part number.

5. Recommended preventative maintenance, including care, cleaning lubrication, service intervals, etc.

6. Troubleshooting procedures.

7. Physical characteristics (weight, size, mounting dimensions, etc.).

8. Installation instructions.

9. Operating instruction.

10. Recommended spare parts and usage for a one (1) year period.

11. Submit for checking purposes a specific set of written operating instructions on each item, which requires instructions to operate. After acceptance, provide one copy for insertion in each Operation and Maintenance Manual.

12. Submit for acceptance maintenance information consisting of manufacturer's printed instructions and parts list for each major item of equipment. After acceptance, insert information in each Operations and Maintenance Manual. Detailed schematic diagrams shall be furnished for all electrical/electronic equipment.

13. Bill of materials.

14. Physical layout plans.

15. Equipment supplier list.

16. Panel schedules shall be submitted with the respective panel data.

17. Special instructions

18. Service maintenance contracts including the name, address and 24 hour phone number and contact of manufacturer's authorized Repair Company.

There shall be no "Black Boxes" for which there are no schematic/wiring diagrams.

106-4.2 OPERATION AND MAINTENANCE MANUALS:

A. O & M Manuals shall consist of a PDF document. The manual shall be bookmarked into sections by Table of Contents, Project Contacts, and each technical specification section. Shop drawings, product data and/or catalog sheets shall be inserted into the O & M PDF by technical specification.

B. Provide correct designation of project on first page of each technical specification submittal section. Description sheet shall be white with black letters, minimum of 11" high and full width of page. Description shall describe project and match project Contract Document description. Description to include submittal type.

C. All documents inserted into the O & M Manual PDF, including but not limited to catalog cut sheets, theory of operation, and all other related product data, shall be the original documentation from the manufacturer.

D. Any scanned documentation shall be legible, and have the correct orientation in the pdf so the document can be read horizontally, from left to right, in line with all other pages in the O & M Manual. Failure to meet these requirements will result in the O & M Manual's rejection. Upon rejection any errata shall be fixed and resubmitted to the engineer for approval.

E. Provide one O & M Manual for the following electrical systems required by the contract documents:

1. Airfield Lighting System

106-4.3 OPERATION AND MAINTENANCE MANUAL CONTENTS:

A. Operation & Maintenance Manuals shall include:

1. First sheet in PDF shall be the cover sheet.

2. The second sheet shall be a table of contents.

3. The third sheet shall be filled out by Contractor and shall list project address of airport, Engineer, Contractor & subcontractor(s).

4. The fourth sheet shall also be filled out by Contractor and list project schedule information showing project "as completed".

5. Shop Drawings: Shop drawings shall be a copy of the final and accepted shop drawings submitted as required in Item SP-106-2. These shall be inserted into the PDF in

specification number/section order. Each catalog sheet shall clearly identify where the product is used and the Contract Document identification for equipment.

6. Product data and/or catalog sheets shall be a copy of the final and accepted submittal submitted as required in Item SP-106-2. These shall be inserted into the PDF in specification number/section order. Each catalog sheet shall clearly identify where the product is used and the Contract Document identification for equipment.

7. Warranty/Guarantee: Provide copy of warranty/guarantee and letters of certification, in respective location in O & M Manual PDF. Original warranty/guarantee shall be incorporated into separate project warranty PDF with warranty/guarantees provided for other items and submitted for Engineer review.

106-4.4 PROCESSING OPERATION AND MAINTENANCE MANUALS:

A. The General Contractor shall review the manuals before submitting to the Engineer. Submit one CD containing the PDF set of O& M Manuals to the owner and one CD containing the PDF set to the Engineer.

106-4.5 DELAYS:

A. Contractor is responsible for delays in job progress accruing directly or indirectly from late submissions or resubmissions of the Operation and Maintenance Manuals.

106-4.6 RE-SUBMITTALS:

A. The Engineer shall be reimbursed the cost to review Operation and Maintenance Manual re-submittals subsequent to the second submittal.

PART 5 – METHOD OF MEASUREMENT

106-5.1 METHOD OF MEASUREMENT

A. The items described in Item SP-106 are incidental to other pay items and shall not be measured for payment.

PART 6 – BASIS OF PAYMENT

106-6.1 BASIS OF PAYMENT

A. No direct payment shall be made for the work described in Item SP-106. The work described in Item SP-106 is incidental to other items and shall be paid for in the respective bid item of which it is a component part.

PART 7 – SUBMITTAL LIST

106-7.1 SUBMITTAL LIST

A. The following is a list of materials expected by the Engineer to be incorporated within the project. This list is not all inclusive as the Contractor's chosen means and methods will have a direct impact on the materials used.

B. It is the intent of this item that all materials used or incorporated into this project is submitted to the Engineer for review.

C. The Contractor shall maintain a submittal register in accordance with Part 2 of this item. The Submittal register shall include all items used or incorporated into the project.

LIST TO FOLLOW:

Drawing/ Specification #	Paragraph Number	Subject
P-605	2	P-605, DOW 888 JOINT SEALANT
P-605	2	DOW 890- SL LEVELING JOINT SEALANT
P-606	3.8	UNITEX PRO-POXY P6O6
P-606	3.8	MAGNOLIA PLASTICS - MAGNOBOND 6504 & MAGNOBOND 6507
L-108	2.2	L-824, #8, 5KV CABLE
L-108	2.4b	L-823, AIRFIELD SECONDARY CONNECTOR AND CHORD SET
L-108	2.4b	L-823, AIRFIELD PRIMARY CONNECTOR KIT
L-108	2.3	#2 BARE SOLID COPPER
L-108	2.3	1/0 BARE COPPER STRANDED CONDUCTOR - GUARD WIRE
L-108	2.3	3/4" COPPER CLAD SECTIONAL GROUND ROD
L-108	2.3	3/4" COPPER CLAD SECTIONAL GROUND ROD COUPLER
L-108	2.3	3/4" COPPER CLAD SECTIONAL GROUND ROD DRIVE STUD
L-108	2.3	CADWELD 3/4" GROUND ROD - #1, #2 AWG SOLID CONDUCTOR (GT1-181V)
L-108	2.3	CADWELD 3/4" GROUND ROD - 1/0 SOLID CONDUCTOR (GT1-182C)
L-108	2.12	3" RED DETECTABLE WARNING TAPE
L-108	2.8	316 STAINLESS STEEL - 18 GAUGE - 2" BLACK FILLED CABLE ID
L-108	2.8	TY-RAP TY525MX - CABLE TIE
L-108	2.9	SCOTCH SUPER 88
L-108	2.9	130C LINERLESS TAPE (2" WIDE)
L-108	2.10	SCOTCHCOAT ELECTRICAL COATING
L-108	3.5d	PENCILLING TOOL
L-110	3.9	CONDUIT PITTING LUBRICANT
L-110	3.1H	POLY PULL ROPE
L-110	2.3	2" & 4" PVC, SCHEDULE 40 CONDUIT W/ INTEGRAL END BELL
L-110	2.3	PVC CONDUIT FITTING - END BELL
L-110	2.3	PVC CONDUIT FITTING - COUPLING
L-110	2.3	PVC CONDUIT FITTING - 90 DEGREE SWEEP
L-110	2.3	PVC CEMENT
L-110	2.4	4" SPLIT DUCT
L-110	2.5	2" & 4" CONDUIT SPACERS
L-110	2.9	HDPE (DIRECTIONAL BORE) CONDUIT 2", 4"
L-110	2.10	GLASPAVE 25

Drawing/ Specification #	Paragraph Number	Subject
SP-111	2.1	AIRFIELD LIGHTING CIRCUIT DATA SHEET - CCR
SP-111	2.1	EARTH RESISTANCE TEST
SP-111	2.1	AIRFIELD LIGHTING CIRCUIT CONTINUITY & INSULATION RESISTANCE TESTING
L-125	3.1	ANTI-SEIZE COMPOUND - KOPR-KOTE
E508	Detail	SIGN AND FIXTURE ID MARKER (SURV-KAP MM B2)
L-125	2.8	L-867D LIGHT BASE 16" DIA - 24" DEEP W/ 1 HUB, 3 GROMMETS - SIGN BASE
L-125	2.8	L-858 AIRFIELD GUIDANCE SIGNS LED - MANUFACTURER CUT SHEET
L-125	2.12	L-867D LIGHT BASE CAN - SIGN - 1 HUB, 3 GROMMETS
L-125		L-858 SIGN PANELS
L-125	45-48	L-867D LIGHT BASE CAN 16" DIA X 24" DP - 6 HUBS
L-125	45-48	L-867 GASKET FOR BASE PLATES AND/OR BLANK COVERS - VARIOUS
L-125	45-48	L-867 D/E GALV STEEL BLANK COVERS - 1/2" THK
L-125	45-48	L-867E LIGHT BASE CAN 24" DIA X 30" DP - 4 HUBS - 6 GROMMETS
L-125	45-48	L-867D LIGHT BASE CAN 16" DIA X 24" DP - JUNCTION CAN
L-125	45-48	JUNCTION CANS/STEEL COVERS
L-125	45-48	L-867B and L-868B GALV STEEL BLANK COVERS - 1/2" & 3/4" THICK
L-125	2.30	FIELD LIGHTNING ARRESTOR CONNECTION THOMPSON 561T BONDING LUG
L-125	2.30	EXTERNAL GROUND STRAP
L-125	2.30A/B	#6 THWN-2, STRANDED COPPER CONDUCTOR - GREEN INSUL. FIXTURE JUMPER
L-125	2.30A/B	#2 STRANDED COPPER - GREEN (THWN-2) FIELD LIGHTNING ARRESTOR & SIGN JUMPER
L-125	2.11	L-861T(L) LED ELEVATED TAXIWAY EDGE LIGHT
L-125	2.15	L-829, 7.5KW, & 10KW CONSTANT CURRENT REGULATOR
L-125	2.13	L-867B - 12" ADJUSTABLE LIGHT BASE 19"-24", WITH GROMMETS
L-125	2.13	L-867 PLYWOOD COVER- 12" DIA X 1/2" THK
L-125	2.13	L-867 MUD PLATE
L-125	2.13	L-867B - 1-1/2" BASE PLATE WITH STUD GROUND BOLT
L-125	2.13	L-868 BOTTOM SECTION 12" DIA X 16" DEEP WITH GROMMETS
L-125	2.13	L-868 MUDPLATE
L-125	2.13	L-868 TOP SECTION 12" DIA
L-125	2.13	L-868 PLYWOOD COVER- 12" DIA X 5/8" THK
L-125	2.13	L-868 12" DIA SPACER RING 3/4" W/ PAVEMENT RING
L-125	2.13	12" HEAVY BASE PLATE, EXTENDED HUB - 10.25" BC
L-125	2.13	COPPER GROUND LUG
L-125	2.13	3/8" CEC LOCKWASHER - 316 STAINLESS STEEL
L-125	2.20	L-830, ISOLATION TRANSFORMER
P-102	1.10	L-893 RUNWAY CLOSURE MARKER
P-306		SW9C5R10 1200 ECONOCRETE
P-401	3.2	12.5MM BITUMINOUS PAVEMENT DESIGN LAB NO. 9244 DATED 1/13/14
P-401	3.2	P-401SP-RM-WM 12.5MM BITUMINOUS PAVEMENT DESIGN (HOT MIX)
Drawing/	Paragraph	Subject

Specification #	Number	
P-401	3.2	P-401SP-RM-WM 12.5MM BITUMINOUS PAVEMENT DESIGN (HOT MIX)
QCP		QUALITY CONTROL PLAN
QCP Final		QUALITY CONTROL PLAN REVISED
P-306	2.2, 2.3, 3.2	MIX CODE = SW9C5R10 - 1200 ECONOCRETE - P-306
P-610	2.1	P-610, CONCRETE MIX DESIGN ELECTRICAL - 3000 PSI IN 2 DAYS
P-610	2.1	P-610, CONCRETE MIX DESIGN ELECTRICAL - 4000 PSI IN 28 DAYS
P-501	2.3	MIX CODE = PA6B4R10 - 700 FLEX #467 BLEND - P-501
P-501	2.9	MATERIAL SAFETY DATA SHEET VEXCON NO. CC101
P-501		SUPPLEMENTAL INFORMATION: AMERICAN AGGREGATES ASTM57 AGRECASA SPEC SHEETS
P-501		SUPPLEMENTAL INFORMATION: TITAN CEMENT & AMERICAN AGGREGATES ASTM C1260
L-125		PRE-CAST CONSTRUCTION OF JUNCTION CAN PLAZA W/4E CAN'S
P-620-3		PREFORMED PAVEMENT MARKINGS 1 AND 2
D-430		LAYNE INLINER
D-755-1		FABRIFORM CONCRETE
D-755-1		FABRIFORM FABRIC
D-755-1		FABRIFORM FABRIC (ADD'L DATA?)
P-605-1		DOW 888 SEALANT
		BACKER ROD JOINT SEAL
P-501		Additional Information for #253
P-501		Supplemental Information for #253 & #253A
P-502	502-2.1	PaveSaver Epoxy Based Elastomeric Concrete Partial Depth Spall Repair Material
P-502	502-2.1	Silspec (Alternate) Flexpatch
P-502	502-2	Existing PCC Pavement Surface Repair
	P-605-4	JOINT SEALANT 890 SL
	P-605-4	ROADSAVER CRACK SEAL
	P-605-4	RIGHT POINTE 3405 REG HOT POUR
D-756	D-756-2	CENTRIFUGALLY CAST PL 8,000
D-756	D-756-2	CENTRIFUGALLY CAST PL 8,000
P-335	P-335-1	MICROSURFACING
D-430	D-430-3.1, 430-3.3	PIPE PRE REPAIR VIDEO LOG (PIPE JOINT AND CRACK SEALING - CHEMICAL GROUT)
D-430		PIPE VIDEOS
D-430	D-430-3.1, D-430-3.3	PIPE VIDEOS
D-430	D-430-3.1, D-430-3.2	18" AND 24" RCP VIDEO & LOG
		CCC PIPE MATERIAL
D-756	D-756-1	INVERT REPAIR MORTAR
D-756	D-756-3*	PIPE LINER
		DYNALINER 18" DESIGN
		DYNALINER 24" DESIGN
		PIPE LINER - LAYNE INLINER - 18" AND 24" (POST CONSTRUCTION SUBMITTALS)
P-620	P-620-3	PREFORMED THERMOPLASTIC MARKINGS FINAL
Drawing/	Paragraph	Subject

Specification #	Number	
D-430	D-430-4.3	PIPE JOINT SEALANT
P-501	P-501	SIKA GROUT 212_PDS DATA AND SIKA GROUT 212-E MSDS
P-605	P-605-3.9	PAVEMENT CONTRACTING-888 TEST STRIP AND PULL TESTS 4-23-2014
P-620	P-620-1 & 2	Hi-Lite Airfield Services Pavement Markings
D-430	D-430-3	42" RCP Post Construction Video & Log
Safety Plan		HEALTH AND SAFETY PROGRAM AND SAFETY PLAN COMPLIANCE DOCUMENT FOR MIDDLESEX AND SUBCONTRACTORS
Safety Plan		SAFETY PLAN COMPLIANCE DOCUMENT
QCP		
P-610		HIGH EARLY MIX AND TEST DATA
		INLINER PRODUCT SUBMITTAL

APPENDIX 1

"EXAMPLE OF COVER SHEET"

AIRPORT NAME

AIRPORT OWNER

PROJECT NAME

AIRPORT PROJECT NUMBER

AIP#

DOT#

AIRFIELD LIGHTING SYSTEM

OPERATION AND MAINTENANCE MANUAL

OWNER MANUAL #1

Note:

Submittal books and spline information similar.

END OF ITEM SP-106

ITEM SP-111 AIRFIELD ELECTRICAL INSTALLATION TESTING

PART 1 – DESCRIPTION

111-1.1 GENERAL:

A. This item shall consist of performing all tasks necessary to prove proper performance of electrical and airfield lighting systems. Airfield lighting systems include airfield signage systems, approach lighting systems and other associated NAVAIDS.

B. Drawings, general provisions and special provisions of the Contract Documents, including Contractual Conditions and Division 1 Specification sections apply to this Item.

C. This section describes the electrical quality control testing furnished by the Contractor. The Contractor shall provide all testing as required by this item, including retesting of failed items. All items furnished and/or installed by the Contractor shall be tested in accordance with this item.

D. The Contractor shall provide for all electrical testing to confirm that the installations associated with this project comply with the Contract Documents.

E. The Contractor shall furnish all equipment, labor, supervision, transportation, materials and appliances necessary or required for testing the airport lighting systems before and after installation. The Contractor shall perform all tests in the presence of the Engineer. The Contractor shall demonstrate the electrical characteristics to the satisfaction of the Engineer. All costs for testing are incidental to the pay item for the respective item being tested.

F. Any system installation errors or discrepancies of installation not in conformance with the Contract Documents shall be corrected at no additional cost to the Owner. Equipment, cables and other components which do not satisfy the test requirements of this Item shall be removed and replaced with new equipment, cables and other components which do satisfy the requirements of this item with no additional cost to the Owner. Any necessary retesting shall be performed at no additional cost to the Owner.

G. There are no approved "repair" procedures for items that have failed testing other than complete replacement. The Contractor shall replace all items that may be damaged during testing at no additional cost to the Owner.

H. Weather information necessary to complete the testing forms may be obtained from the listed website http://www.faa.gov/air_traffic/weather/asos/ by double clicking on the respective state and airport ID.

PART 2 – EQUIPMENT AND MATERIALS

111-2.1 SUBMITTALS:

A. Materials and equipment covered by this item shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the Engineer. All equipment, materials, methods and record keeping procedures shall be submitted to the Engineer for review.

B. The submittal shall include a list of the proposed test and measurement equipment to be used, the test and measurement equipment serial number, the current calibration certificate for each piece of equipment and a written description of the proposed test. A copy of the test and measurement equipment manufacturer's recommended test procedure is acceptable as a written description of the proposed test.

C. Submit a proposed field test plan, 60 days prior to testing the installed system. No field test shall be performed until the test plan is approved. The test plan shall consist of complete field test procedures including tests to be performed, test equipment required, and tolerance limits. The Contractor shall submit a complete list of required tests and a proposed schedule and duration of the tests. The schedule shall be integrated with the overall project schedule. The Contractor shall update the testing schedule on a monthly basis for the duration of the project.

D. All test results shall be submitted in the Operation and Maintenance (O&M) Manual. See Item L-106 for submittal requirements.

E. The Engineer reserves the right to reject any and all equipment, materials or procedures, which, in the Engineer's opinion, does not meet the system design and the standards and codes, specified herein.

111-2.2 SAFETY:

A. Dangerous voltages are present during the system testing. The Contractor is solely responsible for the safety of all personnel involved in the testing activities and shall ensure that all testing areas are secured to prevent the entry of unqualified personnel.

B. Observe all safety instructions or precautions recommended by testing equipment manufacturer.

C. The Contractor shall perform a "Hazard/Risk Evaluation" of each test site and procedure. The Contractor shall provide a job briefing and install the necessary barriers and barricades at the respective approach boundaries prior to starting the testing.

D. The Contractor shall provide and use safety devices such as rubber gloves, protective barriers, and danger signs to protect and warn personnel in the test vicinity. The Contractor shall replace any device or equipment which is damaged due to improper test procedures or handling.

E. In addition to compliance with the Contractors safety program, the Contractor shall comply with the following documents/programs:

1. OSHA, 29CFR1910 Occupational Safety and Health Standards

2. OSHA 29CFR1926 Safety and Health regulations for Construction

3.	NFPA 70B	Recommended Practice for Electrical Equipment Maintenance
4.	NFPA 70E	Standard for Electrical Safety in the Workplace
5.	AC 150/5340-26	Maintenance of Airport Visual Aid Facilities
6.	Owner's safety program.	

111-2.3 QUALIFICATIONS:

A. Each person performing testing shall have a minimum of 5 years (2,000 hours per year) of successful testing experience either constructing or maintaining airfield lighting systems. At least 3 of these years of experience shall have occurred in the last 5 years on projects of comparable size and complexity. Person performing testing shall be certified as a "Qualified Person". The definition of a Qualified Person is defined in OSHA 1910.399 and NFPA 70E (Article 100 & 110.2(1)). The certification shall be signed by the Contractor's Electrical License qualifier. Equivalent experience and training may be considered by the Engineer. Person performing testing may substitute one year of education in qualified electrical curriculum for one-half year electrical experience for a maximum of 2,000 hours of the required 10,000 hours of experience. Records of person performing testing experience demonstrating compliance with these requirements shall be submitted to the Engineer for verification and review prior to starting work. Experience records shall include contact information for references (name, title and phone number) from airports where the proposed person performing testing has completed the required electrical experience. Work shall not start prior to approval of the person performing testing, unless under the direct supervision of the Contractor's Electrical License qualifier.

B. The person performing the tests shall be a "qualified person" as defined in NFPA 70E and OSHA 29 CFR 1926.32(l).

C. The person performing the tests shall be thoroughly familiar with the test equipment used in the test performed and shall be sufficiently experienced to detect equipment abnormalities or questionable data obtained during the test procedure.

D. Each piece of test and measurement equipment utilized to demonstrate compliance with the Contract Documents shall be calibrated. The level of calibration shall be *"NIST traceable, Z540 Calibration with Data*". The test and measurement equipment calibration shall be valid for one year. At any time, the Engineer may require the Contractor to have a piece of test and measurement equipment recalibrated. Should the Engineer have any reason to doubt the accuracy of a piece of test and measurement equipment, even within current calibration, the test and measurement equipment shall be removed from the project. The Engineer shall determine which tests shall be redone due to the malfunctioning equipment.

E. The test and measurement equipment calibration lab as a minimum shall meet the requirements of ANSI/NCSL Z-540 and shall be A2LA accredited.

111-2.4 TESTING COORDINATION:

A. After installation of all required components and before final acceptance, in accordance with project phasing and schedule make required tests to determine proper function of all circuits.

B. Ten days prior to any testing the Contractor shall notify the Engineer of the need to perform testing. A mutually agreed upon time and date for each test will be set. All requirements under this item shall be coordinated with the Engineer.

C. The Contractor shall perform the necessary inspection and tests for some items concurrently with the installation because of subsequent inaccessibility of some components.

D. The Contractor shall ensure that all test and measurement equipment, accessories and qualified personnel are available prior to scheduling tests.

E. Forty-eight (48) hours prior to each test the Contractor shall send the Engineer a written confirmation that the scheduled test will occur at the proposed date and time. Any rescheduling of the test shall be coordinated with the Engineer.

F. The Engineer shall be provided reasonable opportunity to observe all tests. Testing shall not proceed until the Engineer or designated representative is present to observe the testing, or until the Engineer has provided written instruction to proceed with the testing in the Engineer's absence.

G. All test results shall be recorded by the Contractor and witnessed by the Engineer. Test results shall be submitted in the O&M Manuals in accordance with Item L-106.

111-2.5 TEST AND MEASUREMENT EQUIPMENT:

A. Electrical test and measurement equipment shall be an off the shelf item, not a one of a kind prototype. The test and measurement equipment shall be manufactured by a firm regularly engaged in the manufacture of precision electrical test and measurement equipment for the industrial, commercial and utility marketplace. Typical accuracy for test equipment shall be $\pm$ 2% of instrument reading and shall be TRUE RMS.

B. The Engineer shall confirm that the test and measurement equipment proposed for use by the Contractor is suitable for the intended use. The Engineer shall have sole discretion to determine if the test and measurement equipment is suitable for the intended use.

C. The ground point for the cable test equipment shall be the vault ground bus. The vault ground bus, vault ground system, airport ground grid and counterpoise system shall be complete prior to cable testing.

PART 3 – CONSTRUCTION METHODS

111-3.1 COUNTERPOISE TESTING:

A. Continuity of counterpoise system shall be checked by visual inspection as construction progresses, prior to work being covered up.

B. Verification of counterpoise system continuity shall be checked by visual inspection at accessible locations during normal inspections.

C. Verification of counterpoise system continuity to the vault grounding system shall be tested with a micro-ohmmeter. Micro-Ohmmeter shall be Megger Ductor DLRO-10 or accepted equivalent. Resistance readings shall be corrected to standard temperature.

D. Should the counterpoise or ground grid conductors be damaged or are suspected to be damaged by construction activities (in the opinion of the Engineer) the Contractor shall test the conductors for continuity with a micro-ohmmeter. The conductors shall be isolated such that there is no parallel path. Alternatively, the Contractor may conduct tests and through mathematical computations prove the continuity of the conductors.

E. Investigate unsatisfactory results and make necessary corrections or replacements as required by the Contract Documents.

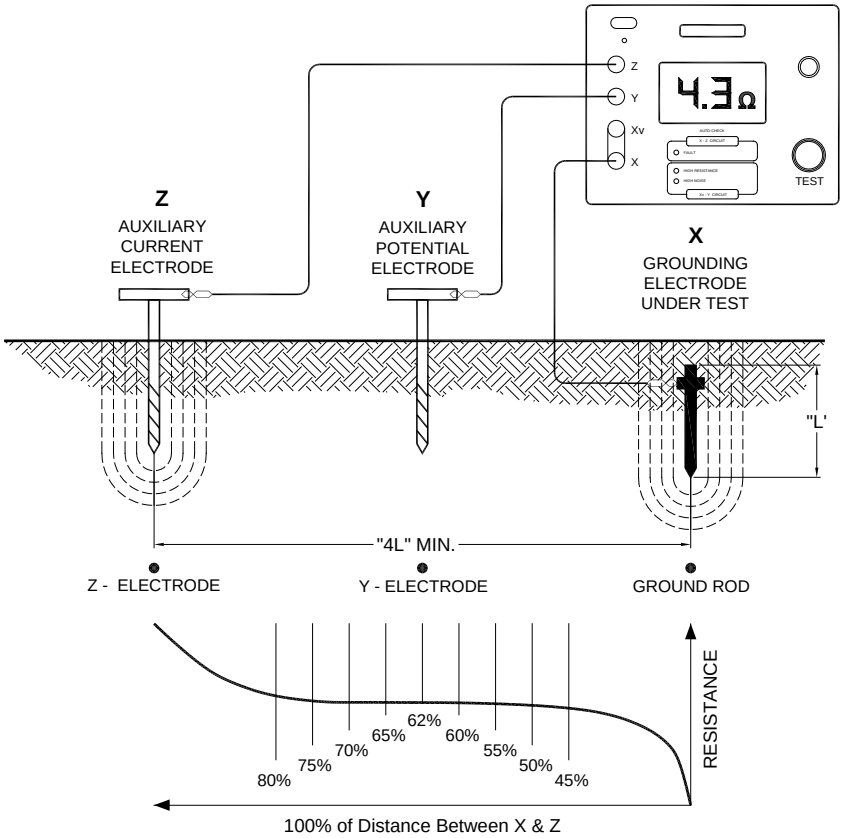
F. Record test results on the record drawing set indicating point to point readings.

111-3.2 GROUND ROD TESTING:

A. Contractor shall provide equipment and personnel to measure the resistance to earth of each ground rod installed. Earth resistance measurement tests shall adhere to recommendations of IEEE Standard 142, latest edition.

B. Earth resistance measurements shall be made in normally dry conditions not less than 48 hours after the last rainfall.

C. Initially the Contractor shall test each ground rod in accordance with the following instructions. The horizontal distance between the Ground Electrode Under Test (Electrode **X**) and the Auxiliary Current Electrode (Electrode **Z**) shall be 4 times the depth (length) of the ground electrode under test.



D. The three electrodes shall be installed in a straight line in a direction away from other underground metallic items. The test leads shall be separated.

E. The first test shall be conducted with the Auxiliary Potential Electrode (Electrode **Y**) at 45% of the distance between the **X** and **Z** electrodes. The earth resistance shall be measured and recorded at the 45% position. The **Y** electrode will then be moved 5% closer to the **Z** electrode to the 50% position and the earth resistance shall be measured and recorded. The previous steps will be repeated at 5% distance intervals through the 80% position. Graph the resultant points on the form provided at the end of this item.

F. The above test method shall be utilized at each new ground rod installation until otherwise determined by the Engineer. The Engineer will use the acquired data to establish a revised distance ratio between the **X** and **Z** electrode.

G. Once the new electrode distance ratio is set by the Engineer, the Contractor may perform the tests with a single test position for electrode **Y**.

H. Earth resistance tests shall be performed as each ground rod is installed. Earth resistance tests shall be conducted prior to the connection of any grounded, grounding or counterpoise conductors. Ground rods not in compliance with the not to exceed maximum earth resistance shall have an additional 10' section(s) added until the required earth resistance is achieved.

I. Should the Contractor install 100 feet of sectional ground rod (ten rods) at a single location and not achieve the required earth resistance, the Contractor shall stop installing rods at this specific location and contact the Engineer for resolution.

111-3.3 FIELD LIGHTNING ARRESTOR ASSEMBLY TESTING: Not Requried

111-3.4 EXISTING AIRFIELD LIGHTING CIRCUIT INSULATION RESISTANCE TESTING:

A. Whenever the scope of work requires connection to an existing circuit, or should the scope of work involve working adjacent to or near an existing circuit, and the work could have any impact on the existing circuit, the existing circuit's insulation resistance shall be tested. The test shall be performed prior to any activity which could possibly affect or impact the respective circuit. The Contractor shall record the results on forms included at the end of this item.

B. The existing airfield lighting circuit insulation resistance test shall be performed with a megohmmeter providing a test voltage of 1,000 volts DC. The output of the megohmmeter shall be direct reading in megohms and shall have an upper range limit in excess of 10 gigohms.

C. Observe required safety precautions.

D. Connect the test instrument in accordance with the manufacturer's recommendations. The insulation resistance test shall be conducted for two (2) minutes). Record data at 30 second intervals on the form provided at the end of this Item. The insulation resistance measurement results shall be corrected to 20^0 Centigrade (68^0 Fahrenheit).

E. When the work effecting the circuit is complete (or at end of shift prior to energization), the circuit's insulation resistance shall be checked again, in the presence of the Engineer. The Contractor shall record the results on forms included at the end of this item. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the circuit to bring the second reading above the first reading.

F. All repair costs including a complete replacement of the L-823 connectors, L-830 transformers and L-824 cable, if necessary, shall be borne by the Contractor.

G. Should the Contractor fail to perform the tests prior to starting work, the Contractor shall be responsible to bring the impacted circuits to a minimum 50 megohm insulation resistance value or higher value in conformance with any previous airport test records.

111-3.5 NEW AIRFIELD LIGHTING CIRCUIT CONTINUITY TESTING:

A. After new cable installation and before the operating test or connection to an existing system, the airfield lighting series circuit cable system shall be given a circuit internal resistance (continuity) test.

B. This test shall be conducted at the proposed point of connection to the Constant Current Regulator and shall be used to prove continuity of the entire circuit. The Contract Documents shall be reviewed to confirm proper circuit routing, connection and installation of necessary components prior to testing.

C. No Field Lighting Arrestor Assemblies shall be installed in the circuit during the internal resistance (continuity) test. No airfield lighting fixtures or signs shall be connected to the secondary of the L-830 isolation transformers internal resistance (continuity) test.

D. The L-824C series circuit cable, complete with all L-823 connectors and L-830 isolation transformers installed, shall be tested for continuity. The cable, connectors and transformers shall be in their final configuration, ready for connection to the constant current regulator (CCR).

E. Observe required safety precautions.

F. The circuit's internal resistance (continuity) test shall be performed using an ohmmeter with sufficient output to measure the circuit's internal resistance. The expected internal circuit resistance should be between 20 ohms and 70 ohms.

G. Investigate unsatisfactory results and make necessary corrections or replacements as required by the Contract Documents.

H. Upon successful completion of circuit's internal resistance (continuity) test, record the measured circuits internal resistance on the cable test form included at the end of this item.

111-3.6 NEW AIRFIELD LIGHTING CIRCUIT INSULATION RESISTANCE TESTING:

A. Upon successful completion of the airfield lighting circuit's internal resistance (continuity) test perform an airfield lighting circuit insulation resistance test.

B. In addition to successfully completing the airfield lighting circuit internal resistance (continuity) test, all prerequisite conditions required prior to performing the airfield lighting circuit internal resistance (continuity) test shall be performed prior to starting the airfield lighting circuit insulation resistance test.

C. Airfield lighting circuit insulation resistance tests shall be made in normally dry conditions not less than 48 hours after the last rainfall.

D. The airfield lighting circuit insulation resistance test shall be performed with a megohmmeter providing a test voltage of 1,000 volts DC. The output of the megohmmeter shall be direct reading in megohms and shall have an upper range limit in excess of 10 gigohms.

E. Observe required safety precautions.

F. Ground all other conductors within the conduits or ducts containing the conductor under test.

G. Connect the test instrument in accordance with the manufacturer's recommendations. The insulation resistance test shall be conducted for ten (10) minutes). Record data at the required intervals on the form provided at the end of this Item. The insulation resistance measurement results shall be corrected to 20^0 Centigrade (68^0 Fahrenheit).

H. The expected insulation resistance for the completed circuit should be in excess of 500 megohms.

I. Investigate unsatisfactory results and make necessary corrections or replacements as required by the Contract Documents.

J. Upon successful completion of circuit's insulation resistance test, record the measured circuits internal resistance on the cable test form included at the end of this item.

111-3.7 CONCLUDING AIRFIELD LIGHTING CIRCUIT TESTS:

A. Upon successful completion of the airfield lighting circuit install and connect all airfield lighting fixtures, signs and perform an airfield lighting circuit insulation resistance test. Conduct test similar to test performed above (111-3.6).

B. Airfield lighting circuit insulation resistance tests shall be made in normally dry conditions not less than 48 hours after the last rainfall.

C. The airfield lighting circuit insulation resistance test shall be performed with a megohmmeter providing a test voltage of 1,000 volts DC. The output of the megohmmeter shall be direct reading in megohms and shall have an upper range limit in excess of 10 gigohms.

D. Observe required safety precautions.

E. Ground all other conductors within the conduits or ducts containing the conductor under test.

F. Connect the test instrument in accordance with the manufacturer's recommendations. The insulation resistance test shall be conducted for ten (10) minutes). Record data at the required intervals on the form provided at the end of this Item. The insulation resistance measurement results shall be corrected to 20^0 Centigrade (68^0 Fahrenheit).

G. The expected insulation resistance for the completed circuit should be in excess of 500 megohms.

H. Investigate unsatisfactory results and make necessary corrections or replacements as required by the Contract Documents.

I. Upon successful completion of circuit's insulation resistance test, record the measured circuits internal resistance on the cable test form included at the end of this item.

J. Install respective circuit designated FLA assemblies. Use the sum of reciprocals rule to calculate the final circuit insulation resistance. Perform insulation resistance test on completed circuit in accordance with above criteria. Record final circuit insulation resistance value on form provided at the end of this Item.

111-3.8 CONSTANT CURRENT REGULATOR (CCR) TESTS:

A. Each constant current regulator shall be examined to ensure that porcelain bushings are not cracked, no shipping damage has occurred, internal and external connections are correct, switches and relays operate freely and are not tied or blocked, fuses, if required, are correct, and liquid level of liquid-filled regulators is correct. Relay panel covers shall be removed only for this examination; it is not necessary to open the main tank of liquid-filled regulators. The Contractor shall comply with the manufacturer's startup and operational instructions. Covers shall be replaced tightly after completing examinations and tests.

B. Verify the supply voltage and nameplate input voltage are the same. Verify CCR is properly grounded. With the loads disconnected, regulator shall be energized and the open circuit protector observed to ensure that it de-energizes the regulator within 2 seconds.

C. Comply with the manufacturer's recommendation for calibration and set up of each new CCR and each existing CCR connected to a new or modified airfield lighting circuit. The regulator output current and voltage shall be calibrated using a true RMS meter. The CCR calibration shall be complete prior to making any other CCR measurements.

D. Verify all airfield lighting fixtures and loads are operational.

E. Complete an Airfield Lighting Circuit Data Sheet for each new CCR and each existing CCR connected to a new or modified airfield lighting circuit.

F. A sample Airfield Lighting Circuit Data Sheet is included at the end of this Item.

G. Record notable current, voltage or power wave forms of the circuits tested to demonstrate and identify normal operation and any unusual circuit characteristics.

H. Comply with the manufacturer's recommendation for calibration and set up of each new CCR and each existing CCR connected to a new or modified airfield lighting circuit. The regulator output current and voltage shall be calibrated using a true RMS meter. The CCR calibration shall be complete prior to opening the lighted pavement to aircraft and prior to performing photometric testing.

I. Investigate unsatisfactory results and make necessary corrections or replacements as required by the Contract Documents.

J. Perform required testing to complete information requested on the Airfield Lighting Circuit Data Sheet.

111-3.9 CONTROL SYSTEM TESTS:

A. The equipment shall be demonstrated to operate in accordance with the requirements of the Contract Documents. Each applicable control device in the air traffic control tower (ATCT) airfield lighting control panel and other control locations shall be operated so that each control device position is engaged at least ten times. During this process, all lights and associated equipment shall be observed to determine that each control device/switch/indicator properly operates the corresponding component. Radio communication between the operator and the observers shall be provided by the Contractor.

B. The above tests shall be repeated for each individual circuit from the local control switches on the regulators. Each installed or revised lighting circuit shall be tested by operating the lamps throughout the range of applicable steps and shall be operated separately at step 3 or step 5 as appropriate for full intensity for not less than 4 hours. Visual examination shall be made at the beginning and at the end of this test to determine that the installed airfield light fixtures are illuminating at full intensity.

C. Investigate unsatisfactory results and make necessary corrections or replacements as required by the Contract Documents.

D. Systems tests shall confirm by demonstration that all airfield lighting circuits are in required operating condition in accordance with the Contract Documents.

111-3.10 FIXTURE WIRING SEQUENCE TEST:

A. The fixture wiring sequence testing shall be performed at night with minimum interference to airport operations.

B. The Contract Documents require all centerline lighting fixtures be wired in numerical order. Touch down zone and edge lights shall be wired in numerical sequence without zig-zagging back and forth across the runway or taxiway.

C. The 5 kV L-824 airfield lighting series circuit cables shall be supplied with factory imprinted numbers.

1. Odd numbered circuits shall utilize:

Wire #1 Routed from the constant current regulator (CCR) output terminal S1 to the lowest numbered fixture in the circuit.

Wire #3 Routed from the lowest numbered fixture to the highest numbered fixture in the circuit. The fixtures shall be connected in numerical sequence. When the series circuit loops back in the same raceway, all fixtures shall be connected into the same leg of the circuit conductor. The return portion of the loop shall not have any fixtures installed into that portion of the conductor.

Wire #5 Routed from the highest numbered fixture in the circuit to the CCR output terminal S2.

2. Even numbered circuits shall use numbers 2, 4 and 6.

D. To verify proper wiring sequence from fixture to fixture temporary intentional grounds shall be inserted into the 5 kV airfield lighting series circuits. The temporary intentional grounds shall be inserted in sequence, one location at a time, at each PC, PT or PI where the cable returns (loops in the same conduit) with the fixture conductor. The Engineer shall designate each point as circuiting is completed.

E. The Contractor is solely responsible for the safety of all personnel, materials and equipment within the construction area. In addition to the Contractor's requirements each temporary intentional ground location shall be barricaded. The barricade shall extend a minimum of twenty-five (25) feet in all directions around the temporary intentional ground. No one shall be allowed within the barricaded area during the test.

F. All wiring for the 5 kV airfield lighting series circuits shall be complete prior to the sequence testing. The test circuit shall consist of the #1 conductor connected between the constant current regulator (CCR) output terminal S1 and the lowest numbered airfield lighting fixture. The #3 conductor connected from fixture to fixture to the first test point noted in the Contract Documents. A temporary intentional ground shall be inserted at this point. The constant current regulator (CCR) output terminal S2 shall be connected to a temporary intentional ground. Each temporary intentional ground shall be barricaded. All personnel shall be outside the barricade. The CCR shall be energized remotely. A visual inspection of the airfield lighting fixtures shall be made to determine proper wiring sequence.

G. The temporary intentional ground shall be moved to the next test point and this procedure shall be repeated for each temporary intentional ground.

H. The final temporary intentional ground for each circuit shall test proper routing of the #1 wire from the CCR output terminal S1 to the lowest numbered fixture. The temporary intentional grounds shall be placed at the output terminal S1 of the CCR and on the #1 wire side of the lowest numbered fixture. Each temporary intentional ground shall be barricaded. All personnel shall be outside the barricade. The CCR shall be energized remotely. A visual inspection of the airfield lighting fixtures shall be made to determine proper wiring sequence.

I. Investigate unsatisfactory results and make necessary corrections or replacements as required by the Contract Documents and retest.

J. Once proper wiring sequence has been verified remove all intentional temporary grounds and place 5 kV airfield lighting series circuits in proper working order.

K. Systems tests shall confirm by demonstration that all airfield lighting circuits are in required operating condition in accordance with the Contract Documents.

111-3.11 AIRFIELD LIGHTING FIXTURE PHOTOMETRIC TESTING: Not Required

111-3.12 AIRFIELD SIGN PHOTOMETRIC TESTING: Not Required

111-3.13 SHORT CIRCUIT / COORDINATION / DEVICE EVALUATION / ARC FLASH ANALYSIS:

A. A Short Circuit, Coordination, Device Evaluation and Arc Flash analysis shall consist of the tasks listed below:

1. This analysis will include: One Line Diagrams, Short Circuit Analysis, Coordination Analysis and Arc Flash Analysis and labels.

2. The selected firm's field service engineer will perform data gathering for analysis completion and device settings, perform device setting as recommended by the analysis and will provide Arc Flash labels with the Arc Flash Analysis. The components worst case value will be considered the available arc flash energy at that point in the system. The Arc Flash Labels will be similar to the example below. The Contractor shall install the new Arc Flash labels and remove all old Arc Flash labels being updated.

ARC FLASH HAZARD LABEL

3. This work will NOT include analysis of any future equipment, or repair or replacement of any electrical equipment found to be damaged or broken.

4. Seven copies of the written analysis and drawings shall be provided at the conclusion of the project. Two copies shall be assigned to the Owner, one copy assigned to the Engineer and one copy shall be inserted in each O&M Manual

B. Two possible vendors/firms to perform the analysis are:

1. Eaton Electrical Services and Systems, Wayne Thompson, 863-287-3985, waynethompson@eaton.com

2. Easy Power, ESA Incorporated, (503) 655-5059 (ask for Engineering Services) services@EasyPower.com or http://www.easypower.com/services/engineering.php

Additional firms may be determined as an accepted equivalent to the firms listed above.

PART 4 – METHOD OF MEASUREMENT

111-4.1 METHOD OF MEASUREMENT:

A. The items described in this section are incidental to other items and shall not be measured for payment.

PART 5 – BASIS OF PAYMENT

111-5.1 BASIS OF PAYMENT:

A. No direct payment shall be made for the work described in this item, except for the Short Circuit/Coordination/Device Evaluation/Arc Flash Analysis. The work described in this item is incidental to other pay items and shall be paid for in the respective bid item of which it is a component part.

B. Payment shall be made at the contract unit price for Short Circuit/Coordination/Device Evaluation/Arc Flash Analysis. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and supervision, engineering, and for all labor, equipment, tools, and incidentals necessary, including but not limited to, site visits and investigation, where required, to complete this item in conformance with the Contract Documents.

Payment will be made under:

Item SP-111-1 Short Circuit/Coordination/Device Evaluation/Arc Flash Analysis -- per Each (EA)

END OF ITEM SP-111

AIRFIELD LIGHTING CIRCUIT DATA SHEET

Circuit Designation:

Date:

Circuit Description:

Ph. Wire Size/Type:

Source Panel/Ckt

GND. Wire Size/Type:

Panel ∅; CB Size:

Conduit Size/Type:

CCR Size:

CCR Output Amps:

CCR Manufacturer:

Yr. Manufactured:

CCR Type No.:

Part No.:

Output Amp Steps: **/ / / /**

Input Volts: Ph.: Hz.:

Input Amps:

Control Voltage:

Serial Number:

Oil Capacity: **Gal.** Oil Test Date:

Weight: **lbs.**

CCR Insp./Calib.: Date:

Circuit Age: **Years**

Insul. Resist. at 1 min.: **Ω @ 1000 V**

Weather:

Lamps in Ckt.: Lamp Watts:

Lamps Out:

Manufacturer's Set up and Calibration Completed by: _____

	Calibration	LOAD TEST							
Step	Output Amps	Output Amps	Output Voltage	Output KVA	Output PF	Input Amps	Input Volts	Input KVA	Input PF
B1/B10									
B2/B30									
B3/B100									
B4									
B5									

Comments:

Earth Resistance Test

Instrument Mfg. _____ Test Date _____

Model _____ Operator Name _____

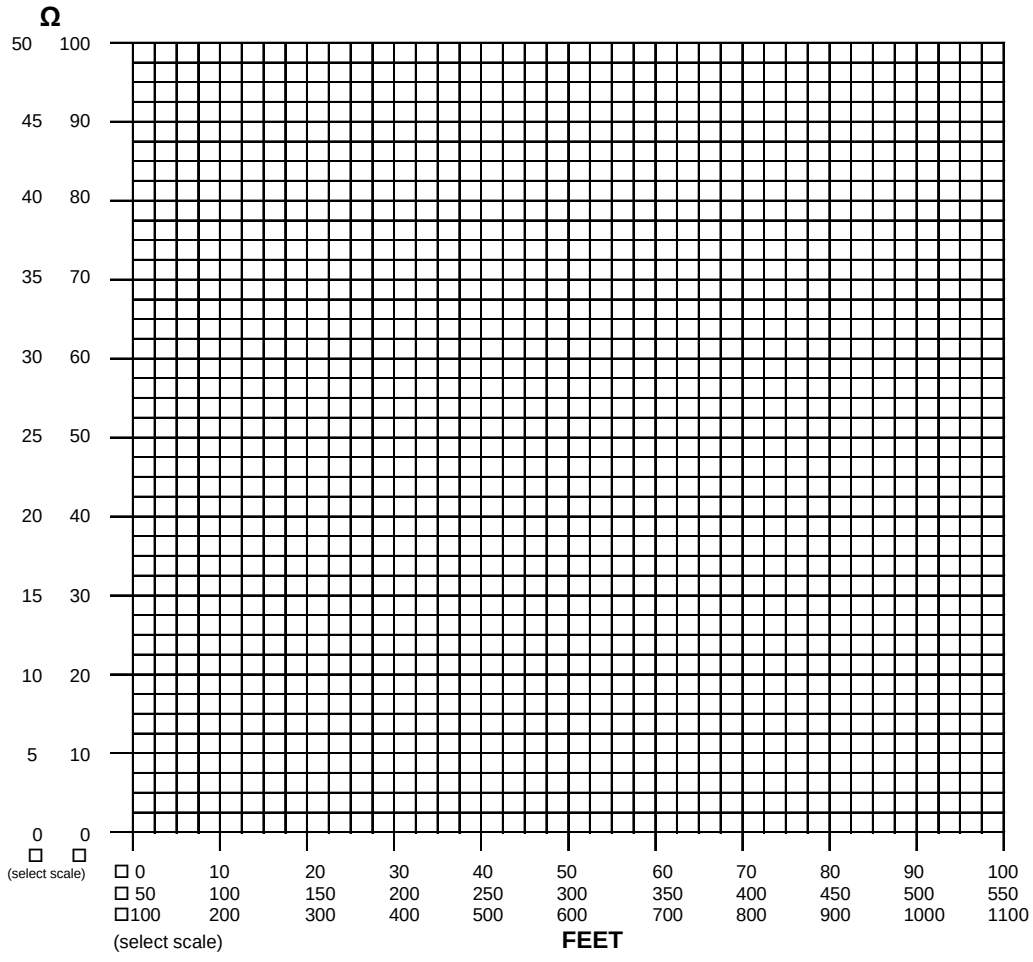
Serial Number _____ Test Location _____

Test Conditions			
Soil Condition:	☐ Moist ☐ Dry	Temperature _____ °F °C	
Soil Type: (choose one)	☐ Clay ☐ Granite ☐ Loam _____	☐ Limestone ☐ Shale ☐ Slate	☐ Sand & Gravel ☐ Sandstone ☐ Other

Weather Conditions
Relative Humidity: _____
Precipitation Accumulation: _____
Sky Conditions: _____

Grounding System
☐ Single Rod
Rod Depth _____ft

%	Voltage Electrode (Y) distance from Ground rod under test (X) FEET	Measured Resistance OHMS
100	_____	_____
90	_____	_____
80	_____	_____
70	_____	_____
60	_____	_____
50	_____	_____
40	_____	_____
30	_____	_____
20	_____	_____
10	_____	_____
0	_____	_____



Comments: _____

_____

_____

Airfield Lighting Circuit Continuity and Insulation Resistance Testing

Date: _____ Start Time: _____ / Stop Time _____

Circuit Designation: _____	Circuit Description _____	Circuit Length _____
Circuit Operating Voltage _____	Circuit Isolation Transformers Qty/Size: _____	
Hazard Risk Evaluation Performed? Yes No	Ambient Temperature: _____ Sky Conditions.: _____	Relative Humidity: _____ Rain last 48hrs: _____
Test Equipment: Manufacturer _____	Model # _____ Serial# _____	Upper Range Limit: _____
Associated Equipment included in test: _____		
Circuit Continuity: _____	Test Voltage: _____	Cable Manufacturer: _____
Tested by: _____	Witness: _____	

Minutes	0.25	0.5	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0
Reading												
Correction												

Megohms: Infinity, 10,000, 5,000, 3,000, 2,000, 1,000, 800, 600, 400, 300, 200, 150, 100, 80, 60, 40, 30, 20, 15, 10, 6, 4, 2, 1, 0.6, 0.2, 0.1, 0.06, 0.02, Zero

Comments: _____

MISCELLANEOUS DOCUMENTATION

BID DOCUMENTS

DFS TERMINAL, HANGAR, AND APRON EXPANSION
DEFUNIAK SPRINGS AIRPORT

GEOTECHNICAL ENGINEERING REPORT

DeFuniak Springs Airport Expansion

DeFuniak Springs, Walton County, Florida

PREPARED FOR:
AVCON, Inc.
320 Bayshore Drive, Suite A
Niceville, Florida 32578

NOVA Project Number: 10111 – 2020054

May 29, 2020

NOVA
PROFESSIONAL | PRACTICAL | PROVEN

NOVA

May 29, 2020

AVCON, Inc.
320 Bayshore Drive, Suite A
Niceville, Florida 32578

Attention: Mr. John Collins, P.E.

Subject: Geotechnical Engineering Report
DeFuniak Springs Airport Expansion
DeFuniak Springs, Walton County, Florida
NOVA Project Number 10111 – 2020054

Dear Mr. Collins,

NOVA Engineering and Environmental LLC (NOVA) has completed the authorized subsurface exploration and geotechnical engineering evaluation for the proposed expansion to the DeFuniak Springs Airport facility in DeFuniak Springs, Walton County, Florida. The work was performed in general accordance with an AVCON Agreement for Professional Services dated May 18, 2020 and industry standards. This report briefly discusses our understanding of the project at the time of the subsurface exploration, describes the geotechnical consulting services provided by NOVA, and presents our findings, conclusions and recommendations.

We appreciate your selection of NOVA and the opportunity to be of service on this project. If you have any questions, or if we may be of further assistance, please do not hesitate to contact us.

Sincerely,
NOVA ENGINEERING AND ENVIRONMENTAL LLC

Andre Kniazeff, P.E.
Senior Geotechnical Engineer
Florida Registration No. 81315

William L. Lawrence, P.E.
Senior Public Engineer
Florida Registration No. 60147

Copies Submitted: Addressee (electronic)

TABLE OF CONTENTS

1.0 SUMMARY

A brief summary of pertinent findings, conclusions and recommendations is presented below. This information should not be utilized in design or construction without reading all of the recommendations presented in the text and Appendix of this report.

1.1 GENERAL

Our field exploration at the subject site included performing six (6) Standard Penetration Test (SPT) borings within the proposed structure footprints and six (6) SPT borings within the proposed pavement areas. Additionally, two (2) bulk samples of the pre-dominant near-surface subgrade soil stratum present below topsoil within the proposed pavement areas were collected for Limerock Bearing Ratio (LBR) testing. Drilling, testing and sampling operations were performed in general accordance with ASTM designations and other industry standards.

The subsurface soils encountered in the SPT borings generally consisted of mixed strata of loose to very dense fine-grained sands to clayey fine-grained sands (USCS classifications of SP, SP-SM, SM, SP-SC, SC-SM and SC) from the existing ground surface elevation to the maximum depth explored of about 30 feet BEG. Subsurface conditions are described in greater detail on the attached Test Boring Records.

1.2 SITE PREPARATION

At the time of our field exploration, the majority of the site had recently been cleared and grubbed preparatory to commencing with the construction of this project. Where applicable, we recommend removing any remaining topsoil and surficial vegetation, associated root systems, and any other deleterious non-soil materials that are found to be present from within the proposed construction limits. The exposed subgrade soils at the stripped grade elevation, as well as subsequent fill lifts, be compacted to a minimum soil density of at least 98 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557). The top 12 inches of pavement subgrades as well as all footing excavations should also be compacted to at least 98 percent.

We recommend densifying (compacting) the upper zone loose sands (N-values of concern varying between 4 and 7) that were encountered in the upper 8 feet to 10 feet of the soil horizon in some of the SPT borings. This can most likely be accomplished by compacting the exposed subgrade from the stripped grade elevation with a heavy weight vibratory roller (i.e., a minimum 10-ton roller, static weight, with a minimum 5-foot drum diameter), as equipment of this size can typically impact sandy soil profiles above groundwater to depths of 5+ feet with proper moisture conditioning. A minimum of 10 overlapping passes in a crisscross pattern should be made by the dynamic roller across the entire stripped area prior to placing any lifts of fill soils.

We note that vibratory compaction operations should not be performed within a clear distance of 50 feet from any adjacent structures.

To provide an increased soil bearing pressure from 1,500 pounds per square foot to 2,500 pounds per square foot (if desired), the subgrade soils present beneath and extending to a minimum distance of 3 feet outside the perimeter of the proposed building footprints should be undercut to a depth of at least 3 feet below current grade elevations, or 3 feet below the planned bottom-of-footing elevation(s) for the proposed structures (whichever is deeper). The soils exposed at that elevation should be compacted using a large drum roller to a minimum soil density of at least 100 percent of the Modified Proctor maximum dry density, and the excavation(s) should then be backfilled in maximum 12-inch (loose thickness) lifts also compacted to at least 100 percent. Subsequent footing excavations should then be compacted to 98 percent.

Verification of the improvement of the loose subgrade soils to a depth of at least 5 feet below current grade elevation(s) within the proposed structure footprints should be achieved via Dynamic Cone Penetrometer (DCP) testing, and additional recommendations (i.e., further compaction effort, possible additional undercutting, etc.) will be rendered in the field as these tests are performed.

A geotechnical engineer should carefully evaluate all subgrades prior to foundation and slab-on-grade construction to confirm compliance with this report; evaluate geotechnical sections of the plans and specifications for the overall project; and provide additional recommendations that may be required.

1.3 GROUNDWATER CONTROL

Groundwater was encountered in the 30-foot deep SPT borings at a uniform depth of about 20 feet BEG and was not encountered in the 10-foot and 15-foot deep SPT borings at the time of our subsurface exploration, which occurred during a period of below normal seasonal rainfall. Groundwater is therefore not expected to adversely impact the planned construction.

1.4 FOUNDATION RECOMMENDATIONS

After the recommended site/subgrade preparation and fill placement, we recommend that the proposed structures be supported on conventional shallow foundation systems bearing upon compacted native soils and/or compacted structural fill. The building foundations may be designed for a maximum soil bearing pressure of **1,500 pounds per square foot (psf) with vibratory compaction preparation practices with an increase to 2,500 psf with employment of the undercutting and backfilling recommended above.**

1.5 PAVEMENT SUBGRADE

To estimate the design California Bearing Ratio (CBR) for the subgrade soils, two (2) bulk samples of the predominant surficial soils present below topsoil were obtained from within the proposed pavement areas, and Limerock Bearing Ratio (LBR) tests were performed. To estimate the CBR of the soils, a conversion factor of 0.8 was applied to the LBR results in accordance with U.S. Department of Transportation Federal Aviation Administration Advisory Circular 150/5320-6F Section 2.5.6. Results of the laboratory LBR testing, estimated CBR and subgrade modulus (k) values are presented in **Section 6.6** of this report.

2.0 INTRODUCTION

2.1 PROJECT INFORMATION

Our understanding of the proposed development is based on recent conversations and email exchanges with the Client, review of aerial photographs of the site via internet-based GIS software; our site reconnaissance activities; and our experience with similar geotechnical conditions in the near vicinity to this project site.

2.1.1 SITE PLANS AND DOCUMENTS

We were furnished with the following documents:

- Document: Conceptual Terminal Site Plan
  Provided by: AVCON, Inc.
  Dated: Not Dated

2.1.2 PROPOSED CONSTRUCTION

NOVA understands that the project will consist of the construction of a new single-story hangar structure with a footprint of approximately 12,000 square feet, a two-story terminal structure with a footprint of approximately 6,000 square feet, and associated pavements. Structural loadings were not available from the design team at the time of the issuance of this report; we have therefore assumed that maximum loadings for the proposed structures will not exceed 60 kips per column for isolated interior columns and 5 kips per lineal foot for continuous load bearing walls.

2.1.3 SITE GRADING

Site grading details were also not available from the design team at the time of the issuance of this report; we have therefore assumed that finished grade elevations within the proposed structure and pavement areas will not change greater than +/- 3 feet from existing grades.

2.2 SCOPE OF WORK

AVCON, Inc., engaged NOVA to provide geotechnical engineering consulting services for the proposed **DeFuniak Springs Airport Expansion** project. This report briefly discusses our understanding of the project, describes our exploratory procedures, and presents our findings, conclusions, and recommendations.

The primary objective of this study was to perform a geotechnical exploration within the proposed structure footprints and pavement areas and to assess these findings as they relate to geotechnical aspects of the planned site development. The authorized geotechnical engineering services included a soil test boring and sampling program, laboratory testing, engineering evaluation of the field and laboratory data, and the preparation of this report.

The services were performed substantially as outlined in an AVCON Agreement for Professional Services dated May 18, 2020, and in general accordance with industry standards.

As authorized per the above referenced Agreement, this completed geotechnical report includes:

- A description of the site, fieldwork, laboratory testing and general soil conditions encountered, together with a Boring Location Plan and individual Test Boring Records.
- Site preparation considerations that include geotechnical discussions regarding site stripping and subgrade preparation and engineered fill/backfill placement.
- Subgrade preparation recommendations and strength estimates based on correlations with test boring results and laboratory data.
- Recommendations for controlling groundwater and/or run-off during construction.
- Foundation system recommendations for the proposed structures as appropriate for the soil profiles encountered.
- Slabs-on-grade construction considerations based on the geotechnical findings, including the need for sub-slab vapor barriers or capillary barriers.
- The measured apparent groundwater levels at the boring locations.
- Summary of laboratory test data performed on selected soil samples.
- Suitability of on-site soils for re-use as structural fill and backfill. Additionally, the criteria for suitable fill materials will be provided.
- Recommended quality control measures (i.e. sampling, testing, and inspection requirements) for site grading and foundation construction.

The assessment of site environmental conditions, including the presence of wetlands or detection of pollutants in the soil, rock or groundwater, laboratory testing of samples, or a site-specific seismic study was beyond the scope of this geotechnical study. If requested, NOVA can provide these services. Additionally, this exploration only focused on the near surface soil conditions and was not intended to include the evaluation of deeper soils or rock strata where the possibility for solution cavities may exist. This report does not address the potential for sinkhole occurrence at this site.

3.0 SITE DESCRIPTION

3.1 LOCATION AND LEGAL DESCRIPTION

The study area is located within the DeFuniak Springs Airport facility located at 1931 U.S. Highway 90 in DeFuniak Springs, Walton County, Florida.

3.2 SUBJECT PROPERTY GENERAL CHARACTERISTICS

At the time of our field exploration, the majority of the study area had recently been cleared and grubbed preparatory to commencing with the construction of this project.

4.0 FIELD AND LABORATORY PROCEDURES

4.1 FIELD EXPLORATION

The boring locations were established in the field by NOVA personnel via a handheld GPS unit. Consequently, the referenced boring locations shown in Appendix B should be considered approximate. If the Client desires increased accuracy, NOVA recommends that the boring locations and elevations be surveyed.

Our field exploration at the subject site included performing:

- Six (6) SPT borings, each to a depth of about 30 feet BEG within the proposed structure footprints.
- Six (6) SPT borings drilled to depths of approximately 10 feet and 15 feet BEG within the proposed pavement areas.
- Collection of two (2) bulk samples of the pre-dominant near-surface subgrade stratum present below topsoil in proposed pavement areas for LBR testing.

SPT Borings: The Standard Penetration Test borings were performed using the guidelines of ASTM Designation D-1586, "Penetration Test and Split-Barrel Sampling of Soils". A mud rotary drilling process was used to advance the borings. At regular intervals, soil samples were obtained with a standard 1.4-inch I.D., 2.0-inch O.D., split-tube sampler. The sampler was first seated six inches and then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot is designated the "Penetration Resistance". The penetration resistance, when properly interpreted, is an index to the soil strength and density. Representative portions of the soil samples, obtained from the sampler, were placed in sealed containers and transported to our laboratory for further evaluation and laboratory testing.

The Test Boring Records provided in Appendix B present the soil conditions encountered in the borings. These records represent our interpretation of the subsurface conditions based on the field exploration data, visual examination of the recovered samples, laboratory test data, and generally accepted geotechnical engineering practices. The stratification lines and depth designations represent approximate boundaries between various subsurface strata. Actual transitions between materials may be gradual.

Groundwater Levels: The groundwater levels reported on the Test Boring Records represent measurements made at the completion of each soil test boring. The soil test borings were subsequently backfilled with the soil cuttings from the drilling process for safety concerns.

4.2 LABORATORY TESTING

A laboratory testing program was conducted to characterize materials existing at the site using split spoon and bulk/grab soil samples recovered from the borings. Collected samples were returned to our testing laboratory, where they were classified using visual/manual methods in accordance with the Unified Soil Classification System (USCS) soil classification system. The laboratory test data is presented in the Appendix. Selected test data are presented on the Test Boring Records attached in the Appendix.

All laboratory testing was performed in general accordance with current ASTM and Florida Methods (FM) standards and included:

- Six (6) Natural Moisture Content Determination Tests (ASTM D-2216)
- Six (6) Fines Content Determination Tests (ASTM D-6913)
- Two (2) Limerock Bearing Ratio (LBR) Tests (FM 5-515)

It should be noted that all soil samples will be properly disposed of 30 days following the submittal of this NOVA subsurface exploration report unless you request otherwise.

5.0 SUBSURFACE CONDITIONS

5.1 GEOLOGY

According to the United States Geological Survey (USGS) the subject site is located in Walton County within the Gulf Coastal Plain, separated from the Florida Platform by geologic structures known as the Gulf Trough and Apalachicola Embayment. These structures formed a bathymetric and environmental barrier from the earliest Eocene or earliest Oligocene periods into the Miocene.

According to the "Text to Accompany the Geologic Map of Florida" by Scott, 2001, the site is generally underlain by the Citronelle Formation which is widespread in the Gulf Coastal Plain. The Citronelle Formation is a siliciclastic, deltaic deposit that is lithologically similar to, and time equivalent with, the Cypresshead Formation and, at least in part, the Long Key Formation (Cunningham *et al*., 1998) of the peninsula. In the western panhandle, some of the sediments mapped as Citronelle Formation may be reworked Citronelle. The lithologies are the same and there are few fossils present to document a possible younger age.

The Citronelle Formation consists of gray to orange, often mottled, unconsolidated to poorly consolidated, very fine to very coarse, poorly sorted, clean to clayey sands. It contains significant amounts of clay, silt and gravel which may occur as beds and lenses and may vary considerably over short distances. Limonite nodules and limonite-cemented beds are common. Marine fossils are rare but fossil pollen, plant remains and occasional vertebrates are found. Much of the Citronelle Formation is highly permeable. It forms the Sand and Gravel Aquifer of the surficial aquifer system.

5.2 SOIL CONDITIONS

The following paragraph provides a generalized description of the subsurface profile and soil conditions encountered by the borings. The Test Boring Records provided in the Appendix should be reviewed to provide more detailed descriptions of the subsurface conditions encountered at the boring locations. Conditions may vary at other locations and times.

The subsurface soils encountered in the SPT borings generally consisted of mixed strata of loose to very dense fine-grained sand to clayey fine-grained sands (USCS classifications of SP, SP-SM, SM, SP-SC, SC-SM and SC) from the existing ground surface elevation to the maximum depth explored of about 30 feet BEG. Subsurface conditions are described in greater detail on the attached Test Boring Records.

5.3 GROUNDWATER CONDITIONS

5.3.1 GENERAL

Groundwater in the Gulf Coastal Plain typically occurs as an unconfined aquifer condition. Recharge is provided by the infiltration of rainfall and surface water through the soil overburden. More permeable zones in the soil matrix can affect groundwater conditions. The groundwater table is expected to be a subdued replica of the original surface topography. Based on a review of topographic maps and our visual site observations, we anticipate the groundwater flow at the site to be generally to the south.

5.3.2 SOIL TEST BORING GROUNDWATER CONDITIONS

Groundwater was encountered in the 30-foot deep borings at a uniform depth of about 20 feet BEG and was not encountered in the 10-foot and 15-foot deep borings at the time of our subsurface exploration, which occurred during a period of below normal seasonal rainfall.

Groundwater levels vary with changes in season and rainfall, construction activity, surface water runoff and other site-specific factors. Groundwater levels in the Walton County area are typically lowest in the late spring and the late fall and highest in the summer with annual groundwater fluctuations by seasonal rainfall; consequently, the water table may vary at times.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on our understanding of the proposed construction, our site observations, our evaluation and interpretation of the field and laboratory data obtained during this exploration, our experience with similar subsurface conditions, and generally accepted geotechnical engineering principles and practices.

Subsurface conditions in unexplored locations or at other times may vary from those encountered at specific boring locations. If such variations are noted during construction, or if project development plans are changed, we request the opportunity to review the changes and amend our recommendations, if necessary.

As previously noted, boring locations were established in the field by estimating distances and angles from existing site landmarks. If increased accuracy is desired by the client, we recommend that the boring locations and elevations be surveyed.

6.1 SITE PREPARATION

At the time of our field exploration, the majority of the site had recently been cleared and grubbed preparatory to commencing with the construction of this project. Where applicable, we recommend removing any remaining topsoil and surficial vegetation, associated root systems, and any other deleterious non-soil materials that are found to be present from within the proposed construction limits. The exposed subgrade soils at the stripped grade elevation be compacted to a minimum soil density of at least 98 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557).

We recommend densifying (compacting) the upper zone of loose sands (N-values of concern varying between 4 and 7) that were encountered in the upper 8 feet to 10 feet of the soil horizon in some of the SPT borings. This can most likely be accomplished by compacting the exposed subgrade from the stripped grade elevation with a heavy weight vibratory roller (i.e., a minimum 10-ton roller, static weight, with a minimum 5-foot drum diameter), as equipment of this size can typically impact sandy soil profiles above groundwater to depths of 5+ feet with proper moisture conditioning. A minimum of 10 overlapping passes in a crisscross pattern should be made by the dynamic roller across the entire stripped area prior to placing any lifts of fill soils.

We note vibratory compaction operations should not be performed within a clear distance of 50 feet from any adjacent structures.

To provide an increased soil bearing pressure from 1,500 pounds per square foot to 2,500 pounds per square foot (if desired), the subgrade soils present beneath and extending to a minimum distance of 3 feet outside the perimeter of the proposed

building footprints should be undercut to a depth of at least 3 feet below current grade elevations, or 3 feet below the planned bottom-of-footing elevation(s) for the proposed structures (whichever is deeper). The soils exposed at that elevation should be compacted using a large drum roller to a minimum soil density of at least 100 percent of the Modified Proctor maximum dry density, and the excavation should then be backfilled in maximum 12-inch (loose thickness) lifts also compacted to at least 100 percent.

Verification of the improvement of the loose subgrade soils to a depth of at least 5 feet below current grade elevation(s) within the proposed structure footprints should be achieved via Dynamic Cone Penetrometer (DCP) testing, and additional recommendations (i.e., further compaction effort, possible undercutting, etc.) can be rendered in the field as these tests are performed.

A geotechnical engineer should carefully evaluate all subgrades prior to foundation and slab-on-grade construction to confirm compliance with this report; evaluate geotechnical sections of the plans and specifications for the overall project; and provide additional recommendations that may be required.

6.2 FILL PLACEMENT

6.2.1 FILL SUITABILITY

Fill materials should be relatively clean sands with less than 12 percent fines (material passing the No. 200 sieve), and free of non-soil materials and rock fragments larger than 3 inches in diameter. On-site near surface soils that are categorized as fine-grained sands and slightly silty as fine-grained sands (SP, SP-SM) based on the Unified Soil Classification System (USCS) are considered suitable for re-use as structural fill in building and pavement areas, provided that the materials are free of rubble, clay, rock, roots and organics.

All materials to be used for backfill or compacted fill construction should be evaluated and, if necessary, tested by NOVA prior to placement to determine if they are suitable for their intended use. Any off-site materials used as fill should be approved by NOVA prior to acquisition. Organic and/or debris-laden material is not suitable for re-use as structural fill.

6.2.2 SOIL COMPACTION

Fill should be placed in thin, horizontal loose lifts (maximum 12-inch) and compacted to a minimum soil density of at least 98 percent of the Modified Proctor maximum dry density (ASTM D-1557), or to 100% if the increased bearing pressure option presented above is employed. The upper 12 inches of soil beneath the bottoms of all foundation footing excavations and the top 12 inches of pavement subgrades should be compacted to at least 98 percent.

In confined areas, such as utility trenches or behind retaining walls, portable compaction equipment and thinner fill lifts (3 to 4 inches) may be necessary. Fill materials used in structural areas should have a target maximum dry density of at least 100 pounds per cubic foot (pcf). If lighter weight fill materials are used, the NOVA geotechnical engineer should be consulted to assess the impact on design recommendations.

Soil moisture content should be maintained within 3 percent of the optimum moisture content. We recommend that the grading contractor have equipment on site during earthwork for both drying and wetting fill soils. Moisture control may be difficult during rainy weather.

Filling operations should be observed by a NOVA soils technician, who can confirm suitability of material used and uniformity and appropriateness of compaction efforts. He/she can also document compliance with the specifications by performing field density tests using thin-walled tube, nuclear, or sand cone testing methods (ASTM D-2937, D-6938, or D-1556, respectively). One test per 2,000 square feet in structure and pavement areas should be performed in each lift of fill, with test locations well distributed throughout the fill mass. When filling in small areas, at least one test per day per area should be performed. One (1) test at conventional spread foundations, one (1) test per lift at each planned column footing area, and one (1) test per 75 linear feet at continuous strip foundations are also recommended.

6.3 GROUNDWATER CONTROL

Groundwater was encountered in the 30-foot deep borings at a uniform depth of about 20 feet BEG and was not encountered in the 10-foot and 15-foot deep borings at the time of our subsurface exploration, which occurred during a period of below normal seasonal rainfall. Groundwater is therefore not expected to adversely impact the planned construction.

6.4 FOUNDATION RECOMMENDATIONS

6.4.1 GENERAL

NOVA understands that the project will include the construction of a new single-story hangar structure with a footprint of approximately 12,000 square feet and a two-story terminal structure with a footprint of approximately 6,000 square feet. Structural loadings were not available from the design team at the time of the issuance of this report; we therefore assume that maximum loadings for the proposed structures will not exceed 60 kips per column for isolated interior columns and 5 kips per lineal foot for continuous load bearing walls.

6.4.2 SHALLOW FOUNDATION SYSTEMS

Design: ***After the recommended site and subgrade preparation and fill placement***, we recommend that conventional shallow foundation systems be used to support the proposed structures. Foundations bearing on densified existing soils and/or compacted structural fill, as recommended in this report, may be designed for a maximum allowable bearing pressure of **1,500 pounds per square foot (psf) with vibratory compaction preparation practices with an increase to 2,500 psf with employment of the undercutting and backfilling recommended above.**

We recommend minimum footing widths of 24 inches for ease of construction and to reduce the possibility of localized shear failures. Exterior and interior footing bottoms should be established at least 20 inches below finished surrounding exterior grades.

Settlement: Settlements for spread foundations bearing on compacted native or approved fill materials were assessed using SPT values to estimate elastic modulus, based on published correlations and previous NOVA experience. We note that the settlements presented are based on the SPT boring results. Conditions may be better or worse in other areas, however, we believe the estimated settlements are reasonably conservative.

Based on the soil bearing capacity provided above, and the presumed foundation elevations as discussed above, we expect primary total settlement beneath individual foundations to be on the order of 1 inch or less. The final deflected shape of the structure will be dependent on actual foundation locations and loading.

Foundation support conditions are highly erratic and may vary dramatically in short horizontal distances. It is anticipated that the geotechnical engineer may recommend a different bearing capacity upon examination of the actual foundation subgrade at numerous locations. To reduce the differential settlement if lower consistency materials are encountered, a lower bearing capacity should be used, or the foundations should be extended to more competent materials.

We anticipate that timely communication between the geotechnical engineer and the structural engineer, as well as other design and construction team members, will be required.

Construction: Foundation excavations should be evaluated by the NOVA geotechnical engineer prior to reinforcing steel placement to observe foundation subgrade preparation and confirm bearing pressure capacity. Foundation

excavations should be level and free of debris, ponded water, mud, and loose, frozen, or water-softened soils. Concrete should be placed as soon as is practical after the foundation is excavated and the subgrade evaluated. Foundation concrete should not be placed on frozen or saturated soil. If a foundation excavation remains open overnight, or if rain or snow is imminent, a 3 to 4-inch thick "mud mat" of lean concrete should be placed in the bottom of the excavation to protect the bearing soils until reinforcing steel and concrete can be placed.

6.5 SLABS-ON-GRADE

The conditions exposed at subgrade levels will vary across the site and may include structural fill or densified in-situ soils. Slabs-on-grade may be adequately supported on these subgrade conditions subject to the recommendations in this report. Slabs-on-grade should be jointed around columns and along walls to reduce cracking due to differential movement. Underdrain systems are not necessary beneath slabs, provided that slabs are installed at least 2 feet above the post development high groundwater level. Impermeable vapor barriers are recommended beneath finished spaces to reduce dampness.

Once grading is completed, the subgrade can be exposed to adverse construction activities and weather conditions during the period of sub-slab utility installation. The subgrade should be well drained to prevent the accumulation of water. If the exposed subgrade becomes unstable, excessively wet or exhibits excessive rutting or pumping, the geotechnical engineer should be consulted.

6.6 PAVEMENT SUBGRADE

Based on the results of our field exploration, the subsurface conditions encountered in the test borings appear to be adaptable for providing adequate support of the planned pavement sections.

To estimate the design California Bearing Ratio (CBR), two (2) bulk samples of the predominant surficial soils were obtained from within the proposed runway extension alignment and cut areas of the site, and Limerock Bearing Ratio (LBR) tests were then performed. To estimate the CBR value of the obtained soil samples, a conversion factor of 0.8 was applied to the LBR results in accordance with US Department of Transportation Federal Aviation Administration Advisory Circular 150/5320-6F, Section 2.5.6.

We recommend that a minimum compaction requirement of 98 percent of the maximum dry density be specified for the Stabilized Subgrade Course as determined by the Modified Proctor test (ASTM D-1557). All pavement material and paving operations should meet applicable specifications of the American Concrete Institute and Federal Aviation Administration requirements. A NOVA technician should observe placement and perform density testing of the stabilized subgrade, base course material and concrete.

Results of the laboratory LBR testing, as well as estimated CBR and subgrade modulus (k) values, are presented below in Table 1.

Table 1 – Results of CBR Testing and Subgrade Modulus Values

Corresponding Sampling and Boring Locations	LBR-1	LBR-2
LBR Value (at 0.1-inch penetration)	35	57
Estimated CBR Value	28	46
Fines Content (minus the #200 sieve, %)	7	9
Estimated Subgrade Modulus, *k* (psi/in)	315	460

7.0 CONSTRUCTION OBSERVATIONS

7.1 SHALLOW FOUNDATIONS

Foundation excavations should be level and free of debris, ponded water, mud, and loose, frozen or water-softened soils. All foundation excavations should be evaluated by a NOVA geotechnical engineer prior to reinforcing steel placement to observe foundation subgrade preparation and assess bearing pressure capacity. Due to variable site subsurface and construction conditions, some adjustments in isolated foundation bearing pressures, depth of foundations or undercutting and replacement with controlled structural fill may be necessary.

7.2 PAVEMENT SECTION

The pavement section should utilize materials and be constructed in accordance with applicable Federal Aviation Administration (FAA) specifications. Also, NOVA should be retained during construction to confirm subgrade conditions are as anticipated and that the construction process is as required by the contract documents.

7.3 SUBGRADE

Once site grading is completed, the subgrade may be exposed to adverse construction activities and weather conditions. The subgrade should be well-drained to prevent the accumulation of water. If the exposed subgrade becomes saturated or frozen, the NOVA geotechnical engineer should be consulted.

APPENDIX A
Figures and Maps

Base map provided by ***Google Earth***

Scale: Not To Scale	
Date Drawn: May 19, 2020	
Drawn By: K. Selle	
Checked By: A. Kniazeff	

NOVA

17612 Ashley Drive
Panama City Beach, Florida 32413
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PROJECT LOCATION MAP

DeFuniak Springs Airport Expansion

DeFuniak Springs, Walton County, Florida

NOVA Project Number 10111-2020054

Soil Map—Walton County, Florida
(DeFuniak Springs Airport Expansion, 10111-2020054)

Map Scale: 1:1,320 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 15 30 60 90

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Walton County, Florida
Survey Area Data: Version 19, Sep 17, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

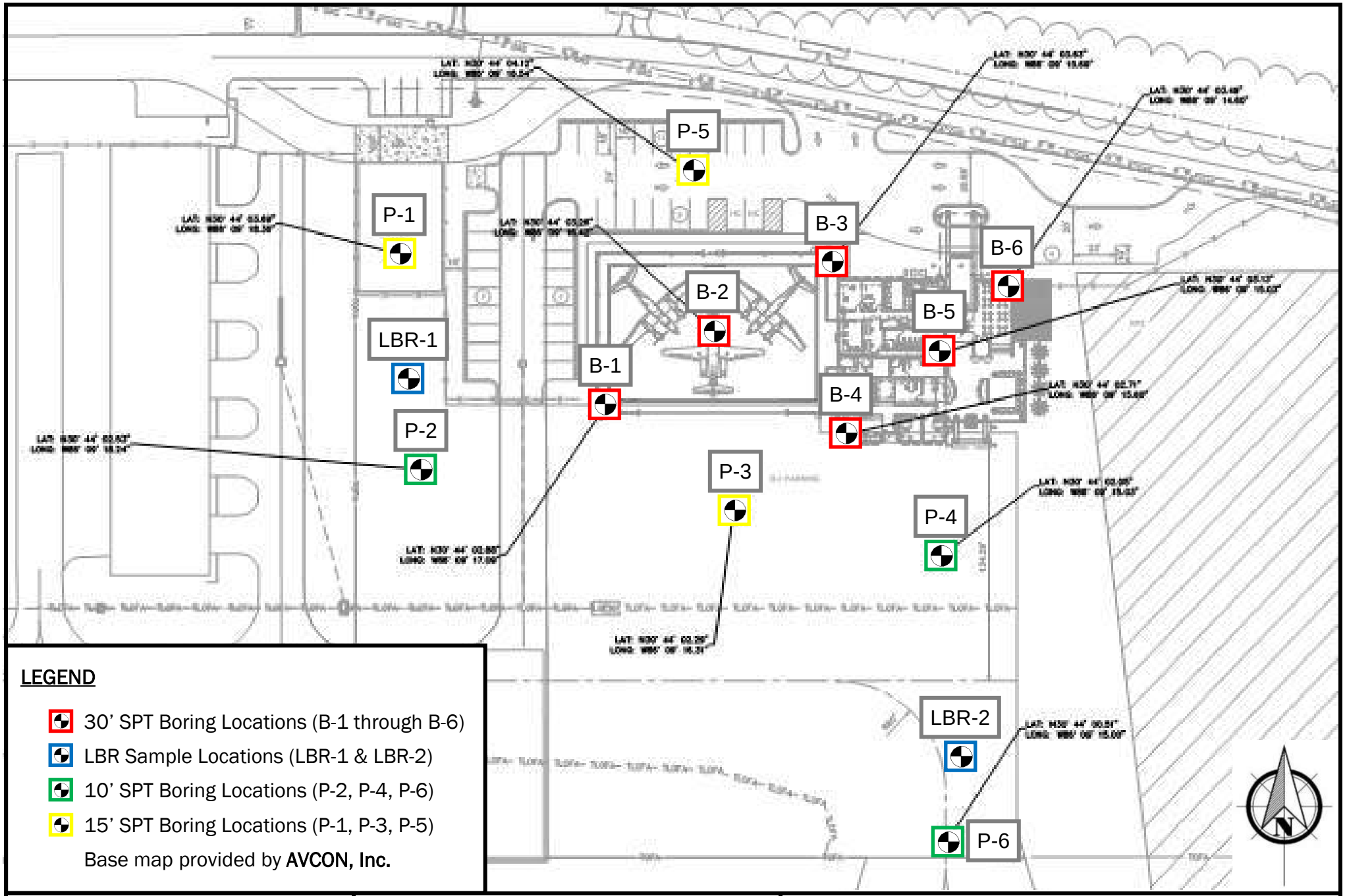
Date(s) aerial images were photographed: Dec 31, 2009—Dec 10, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
17	Lakeland sand, 0 to 5 percent slopes	7.8	100.0%
Totals for Area of Interest		**7.8**	**100.0%**

APPENDIX B
Subsurface Data



LEGEND

- 30’ SPT Boring Locations (B-1 through B-6)
- LBR Sample Locations (LBR-1 & LBR-2)
- 10’ SPT Boring Locations (P-2, P-4, P-6)
- 15’ SPT Boring Locations (P-1, P-3, P-5)

Base map provided by **AVCON, Inc.**

Scale:	Not To Scale
Date Drawn:	May 21, 2020
Drawn By:	D. Ritzel
Checked By:	A. Kniazeff

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BORING LOCATION PLAN
DeFuniak Springs Airport Expansion
DeFuniak Springs, Walton County, Florida
NOVA Project Number 10111-2020054

KEY TO BORING LOGS

SYMBOLS AND ABBREVIATIONS

SYMBOL	DESCRIPTION
N-Value	No. of Blows of a 140-lb. Weight Falling 30 Inches Required to Drive a Standard Spoon 1 Foot
WOR	Weight of Drill Rods
WOH	Weight of Drill Rods and Hammer
	Sample from Auger Cuttings
	Standard Penetration Test Sample
	Thin-wall Shelby Tube Sample (Undisturbed Sampler Used)
% REC	Percent Core Recovery from Rock Core Drilling
RQD	Rock Quality Designation
	Stabilized Groundwater Level
	Seasonal High Groundwater Level (also referred to as the W.S.W.T.)
NE	Not Encountered
GNE	Groundwater Not Encountered
BT	Boring Terminated
-200 (%)	Fines Content or % Passing No. 200 Sieve
MC (%)	Moisture Content
LL	Liquid Limit (Atterberg Limits Test)
PI	Plasticity Index (Atterberg Limits Test)
K	Coefficient of Permeability
Org. Cont.	Organic Content
G.S. Elevation	Ground Surface Elevation

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS More than 50% retained on the No. 200 sieve*	GRAVELS 50% or more of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		GRAVELS WITH FINES	GM	Silty gravels and gravel-sand-silt mixtures
			GC	Clayey gravels and gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS 5% or less passing No. 200 sieve	SW**	Well-graded sands and gravelly sands, little or no fines
			SP**	Poorly graded sands and gravelly sands, little or no fines
		SANDS with 12% or more passing No. 200 sieve	SM**	Silty sands, sand-silt mixtures
			SC**	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more passes the No. 200 sieve*	SILTS AND CLAYS Liquid limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50%		MH	Inorganic silts, micaceous or diamicaceous fine sands or silts, elastic silts
			CH	Inorganic clays or clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
			PT	Peat, muck and other highly organic soils

*Based on the material passing the 3-inch (75 mm) sieve
** Use dual symbol (such as SP-SM and SP-SC) for soils with more than 5% but less than 12% passing the No. 200 sieve

RELATIVE DENSITY
(Sands and Gravels)
Very loose – Less than 4 Blow/Foot
Loose – 4 to 10 Blows/Foot
Medium Dense – 11 to 30 Blows/Foot
Dense – 31 to 50 Blows/Foot
Very Dense – More than 50 Blows/Foot

CONSISTENCY
(Silts and Clays)
Very Soft – Less than 2 Blows/Foot
Soft – 2 to 4 Blows/Foot
Medium Stiff – 5 to 8 Blows/Foot
Stiff – 9 to 15 Blows/Foot
Very Stiff – 16 to 30 Blows/Foot
Hard – More than 30 Blows/Foot

RELATIVE HARDNESS
(Limestone)
Soft – 100 Blows for more than 2 Inches
Hard – 100 Blows for less than 2 Inches

MODIFIERS

These modifiers Provide Our Estimate of the Amount of Minor Constituents (Silt or Clay Size Particles) in the Soil Sample
Trace – 5% or less
With Silt or With Clay – 6% to 11%
Silty or Clayey – 12% to 30%
Very Silty or Very Clayey – 31% to 50%

These Modifiers Provide Our Estimate of the Amount of Organic Components in the Soil Sample
Trace – Less than 3%
Few – 3% to 4%
Some – 5% to 8%
Many – Greater than 8%

These Modifiers Provide Our Estimate of the Amount of Other Components (Shell, Gravel, Etc.) in the Soil Sample
Trace – 5% or less
Few – 6% to 12%
Some – 13% to 30%
Many – 31% to 50%

NOVA

TEST BORING RECORD B-1

PROJECT NAME: DeFuniak Springs Airport Expansion
PROJECT NO.: 2020054 **CLIENT:** AVCON, Inc.
PROJECT LOCATION: DeFuniak Springs, Walton County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: L. Griffin **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **DATE:** 5/21/2020
APPARENT GW DEPTH: ▼ 20.0 feet **ESHGW DEPTH:** ▽ GNE

Depth (feet)	Material Description	N-Value
0		
	Loose light brown slightly silty fine-grained SAND (SP-SM)	4
	Loose brown/light brown to light brown fine-grained SAND (SP)	4
5		4
		5
	Loose orange/light brown silty clayey fine-grained SAND (SC-SM)	8
10		
	Medium dense to dense light grey/light brown to light grey silty fine-grained SAND (SM)	28
15		
		31
20		
	Medium dense orange/brown slightly silty fine-grained SAND (SP-SM)	23
25		
	Medium dense light grey/light brown fine-grained SAND (SP)	20
30	Boring Terminated at 30 feet	

Graphic: ● N-Value (Blows per Foot) ▲ Moisture Content (%) ◇ Organic Content (%) ■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

Groundwater: ▼ at 20 feet

Sample Type

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD B-2

PROJECT NAME: DeFuniak Springs Airport Expansion
PROJECT NO.: 2020054 **CLIENT:** AVCON, Inc.
PROJECT LOCATION: DeFuniak Springs, Walton County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: L. Griffin **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **DATE:** 5/21/2020
INITIAL GW DEPTH: ▼ 20.0 feet **ESHGW DEPTH:** ▽

Depth (feet)	Material Description	Graphic	Groundwater	Sample Type	N-Value
0					
	Loose grey/brown to light brown fine-grained SAND (SP)				6
					6
5					4
					5
	Loose light brown/orange slightly silty fine-grained SAND (SP-SM)				7
10					
	Medium dense light grey silty fine-grained SAND (SM)				24
15					
	Medium dense orange/brown silty clayey fine-grained SAND (SC-SM)		▼		24
20					
	Medium dense light grey silty fine-grained SAND (SM)				24
25					
	Medium dense light grey fine-grained SAND (SP)				22
30					
	Boring Terminated at 30 feet				

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD B-3

PROJECT NAME: DeFuniak Springs Airport Expansion
PROJECT NO.: 2020054 **CLIENT:** AVCON, Inc.
PROJECT LOCATION: DeFuniak Springs, Walton County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: L. Griffin **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **DATE:** 5/21/2020
INITIAL GW DEPTH: ▼ 20.0 feet **ESHGW DEPTH:** ▽

Depth (feet)	Material Description	Graphic	Groundwater	Sample Type	N-Value
0	Medium dense brown/dark brown slightly silty fine-grained SAND (SP-SM)				11
					13
5	Loose light brown fine-grained SAND (SP)				6
	Loose light brown/orange slightly silty fine-grained SAND (SP-SM)				6
	Loose light grey/orange clayey fine-grained SAND (SC)				7
10					
15	Medium dense to dense light grey/orange to light grey silty clayey fine-grained SAND (SC-SM)				33
			▼		28
20					
25					22
30	Medium dense light grey slightly silty fine-grained SAND (SP-SM)				22
	Boring Terminated at 30 feet				

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD B-4

PROJECT NAME: DeFuniak Springs Airport Expansion
PROJECT NO.: 2020054 **CLIENT:** AVCON, Inc.
PROJECT LOCATION: DeFuniak Springs, Walton County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: L. Griffin **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **DATE:** 5/21/2020
INITIAL GW DEPTH: ▼ 20.0 feet **ESHGW DEPTH:** ▽

Depth (feet)	Material Description	N-Value
0		
	Loose light brown fine-grained SAND (SP)	5
		4
5		4
	Loose light brown/orange silty fine-grained SAND (SM)	4
		8
10		
	Medium dense light brown/orange slightly silty fine-grained SAND (SP-SM)	24
15		
	Medium dense light grey slightly clayey fine-grained SAND (SP-SC)	29
20		
	Medium dense light grey slightly silty fine-grained SAND (SP-SM)	27
25		
	Medium dense light grey fine-grained SAND (SP)	25
30		
	Boring Terminated at 30 feet	

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD B-5

PROJECT NAME: DeFuniak Springs Airport Expansion
PROJECT NO.: 2020054 **CLIENT:** AVCON, Inc.
PROJECT LOCATION: DeFuniak Springs, Walton County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: L. Griffin **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **DATE:** 5/21/2020
APPARENT GW DEPTH: ▼ 20.0 feet **ESHGW DEPTH:** ▽ GNE

Depth (feet)	Material Description	N-Value
0	Loose light brown slightly silty fine-grained SAND (SP-SM)	5
5	Loose light brown fine-grained SAND (SP)	4
		4
	Loose light brown/orange silty fine-grained SAND (SM)	5
	Loose to medium dense orange/brown to light grey silty clayey fine-grained SAND (SC-SM)	7
10		
15		28
20		27
25	Medium dense light grey slightly silty fine-grained SAND (SP-SM)	20
30		22
	Boring Terminated at 30 feet	

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD B-6

PROJECT NAME: DeFuniak Springs Airport Expansion
PROJECT NO.: 2020054 **CLIENT:** AVCON, Inc.
PROJECT LOCATION: DeFuniak Springs, Walton County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: L. Griffin **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **DATE:** 5/21/2020
INITIAL GW DEPTH: ▼ 20.0 feet **ESHGW DEPTH:** ▽

Depth (feet)	Material Description	N-Value
0	Loose brown/light brown to light brown fine-grained SAND (SP)	5
5		4
		6
	Loose light brown/orange silty fine-grained SAND (SM)	6
	Loose to medium dense light brown/orange silty clayey fine-grained SAND (SC-SM)	10
10		
15		28
20	Medium dense to dense light brown to light grey slightly silty fine-grained SAND (SP-SM)	33
25		26
	Medium dense light grey fine-grained SAND (SP)	21
30	Boring Terminated at 30 feet	

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

NOVA

TEST BORING RECORD P-1

PROJECT NAME: DeFuniak Springs Airport Expansion
PROJECT NO.: 2020054 **CLIENT:** AVCON, Inc.
PROJECT LOCATION: DeFuniak Springs, Walton County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: L. Griffin **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **DATE:** 5/21/2020
INITIAL GW DEPTH: ▼ GNE feet **ESHGW DEPTH:** ▽

Depth (feet)	Elevation	Material Description	Graphic	Groundwater	Sample Type	N-Value
0		Medium dense to very dense orange/brown silty fine-grained SAND (SM)				14
						32
5						67
		Dense to very dense orange/brown slightly silty fine-grained SAND (SP-SM)				65
						60
10						
15						36
		Boring Terminated at 15 feet				

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)

PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD P-2

PROJECT NAME: DeFuniak Springs Airport Expansion
PROJECT NO.: 2020054 **CLIENT:** AVCON, Inc.
PROJECT LOCATION: DeFuniak Springs, Walton County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: L. Griffin **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **DATE:** 5/21/2020
INITIAL GW DEPTH: ▼ GNE feet **ESHGW DEPTH:** ▽

Depth (feet)	Elevation	Material Description	Graphic	Groundwater	Sample Type	N-Value
0		Medium dense orange/brown slightly silty fine-grained SAND (SP-SM)				12
		Dense orange/brown silty fine-grained SAND (SM)				36
5						40
		Dense to very dense orange/brown slightly silty fine-grained SAND (SP-SM)				47
						54
10		Boring Terminated at 10 feet				

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD P-3

PROJECT NAME: DeFuniak Springs Airport Expansion
PROJECT NO.: 2020054 **CLIENT:** AVCON, Inc.
PROJECT LOCATION: DeFuniak Springs, Walton County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: L. Griffin **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **DATE:** 5/21/2020
INITIAL GW DEPTH: ▼ GNE feet **ESHGW DEPTH:** ▽

Depth (feet)	Material Description	N-Value
0	Loose brown to light brown fine-grained SAND (SP)	4
		4
5		4
	Loose orange/brown silty fine-grained SAND (SM)	6
		7
10		
	Medium dense light grey/orange slightly silty fine-grained SAND (SP-SM)	16
15	Boring Terminated at 15 feet	

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD P-4

PROJECT NAME: DeFuniak Springs Airport Expansion
PROJECT NO.: 2020054 **CLIENT:** AVCON, Inc.
PROJECT LOCATION: DeFuniak Springs, Walton County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: L. Griffin **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **DATE:** 5/21/2020
INITIAL GW DEPTH: ▼ GNE feet **ESHGW DEPTH:** ▽

Depth (feet)	Elevation	Material Description	Graphic	Groundwater	Sample Type	N-Value
0		Loose brown/light brown slightly silty fine-grained SAND (SP-SM)				6
		Loose light brown fine-grained SAND (SP)				4
5		Loose brown/light brown slightly silty fine-grained SAND (SP-SM)				6
		Loose brown/orange silty clayey fine-grained SAND (SC-SM)				7
10						10
		Boring Terminated at 10 feet				

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

NOVA

TEST BORING RECORD P-5

PROJECT NAME: DeFuniak Springs Airport Expansion
PROJECT NO.: 2020054 **CLIENT:** AVCON, Inc.
PROJECT LOCATION: DeFuniak Springs, Walton County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: L. Griffin **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **DATE:** 5/21/2020
INITIAL GW DEPTH: ▼ GNE feet **ESHGW DEPTH:** ▽

Depth (feet)	Elevation	Material Description	Graphic	Groundwater	Sample Type	N-Value
0		Loose to medium dense brown/light brown to light brown fine-grained SAND (SP)				11
						11
5						6
						5
		Loose to medium dense orange/brown to light grey/orange slightly silty fine-grained SAND (SP-SM)				5
10						
						22
15		Boring Terminated at 15 feet				

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)

PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

TEST BORING RECORD P-6

PROJECT NAME: DeFuniak Springs Airport Expansion
PROJECT NO.: 2020054 **CLIENT:** AVCON, Inc.
PROJECT LOCATION: DeFuniak Springs, Walton County, Florida
LOCATION: See Boring Location Plan **ELEVATION:** Existing Grade
DRILLED BY: L. Griffin **LOGGED BY:** K. Selle
DRILLING METHOD: Mud Rotary **DATE:** 5/21/2020
INITIAL GW DEPTH: ▼ GNE feet **ESHGW DEPTH:** ▽

Depth (feet)	Elevation	Material Description	Graphic	Groundwater	Sample Type	N-Value
0		Loose orange/brown slightly silty fine-grained SAND (SP-SM)				10
5		Loose light brown fine-grained SAND (SP)				6, 4
		Loose orange/brown slightly silty fine-grained SAND (SP-SM)				6
10		Loose orange/brown silty clayey fine-grained SAND (SC-SM)				8
		Boring Terminated at 10 feet				

● N-Value (Blows per Foot)
▲ Moisture Content (%)
◇ Organic Content (%)
■ Fines Content (%)
PL LL
10 20 30 40 50 60 70 80 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

Note:

APPENDIX C
Laboratory Data

SUMMARY OF CLASSIFICATION & INDEX TESTING

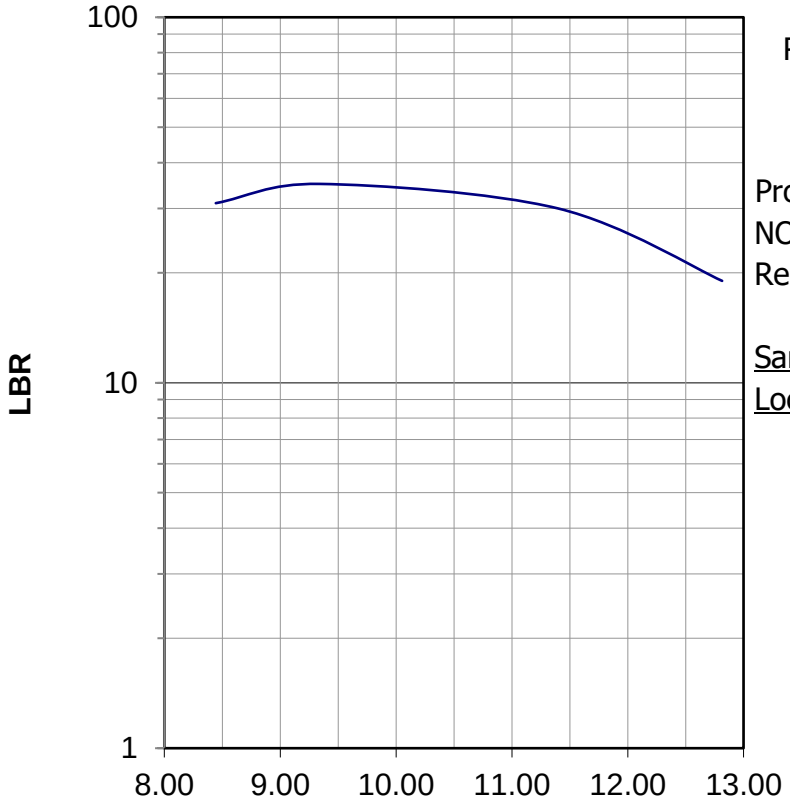
DeFuniak Springs Airport Expansion
DeFuniak Springs, Walton County, Florida
NOVA Project Number 10111-2020054

Boring Number	Sample Depth	Natural Moisture (%)	Percent (%) Passing Sieve #200	USCS Soil Classification
P-1	0.0 - 2.0	6	16.0	SM
P-2	2.0 - 4.0	11	19.2	SM
P-6	0.0 - 2.0	3	8.0	SP-SM
B-1	0.0 - 2.0	2	7.3	SP-SM
B-3	8.0 - 10.0	11	24.9	SC
B-6	6.0 - 8.0	13	22.8	SM

NOVA

17612 Ashley Drive
Panama City Beach, FL 32413
(850) 249-NOVA(6682)
Fax:(850) 249-6683

LBR @ 0.1" Penetration

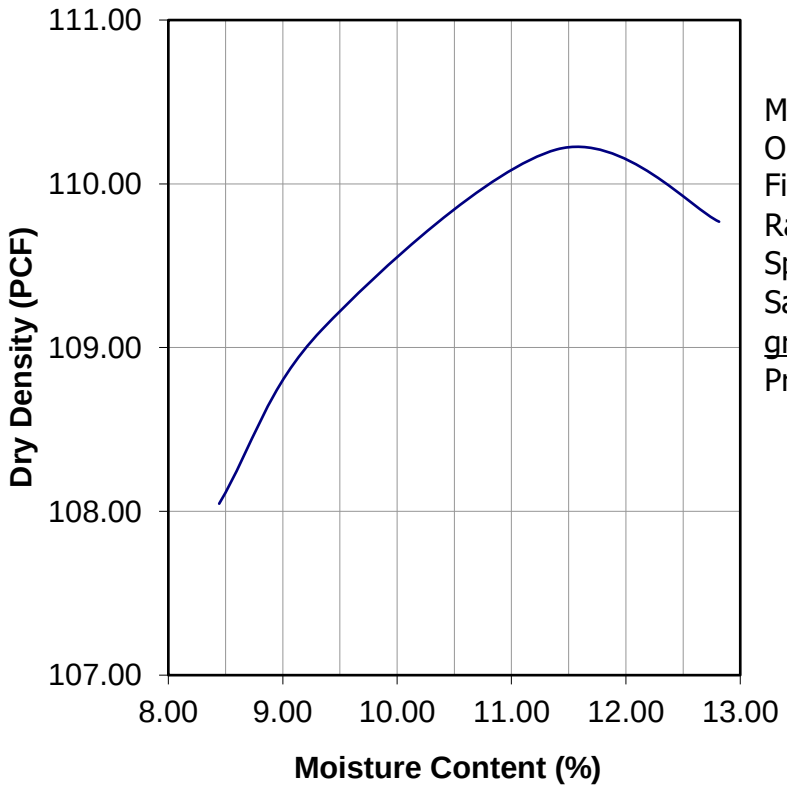


Report of Limerock Bearing Ratio (FM 5-515) and Modified Proctor ASTM D-1557, and AASHTO T-180

Project Name: DeFuniak Springs Airport Expansion
NOVA Project Number: 10111-2020054
Report Date: May 28, 2020

Sample ID: LBR-1
Location: LBR-1 (0.5' - 1.0' BEG)

LBR RESULTS
(FM 5-515)
Maximum LBR Value: 35

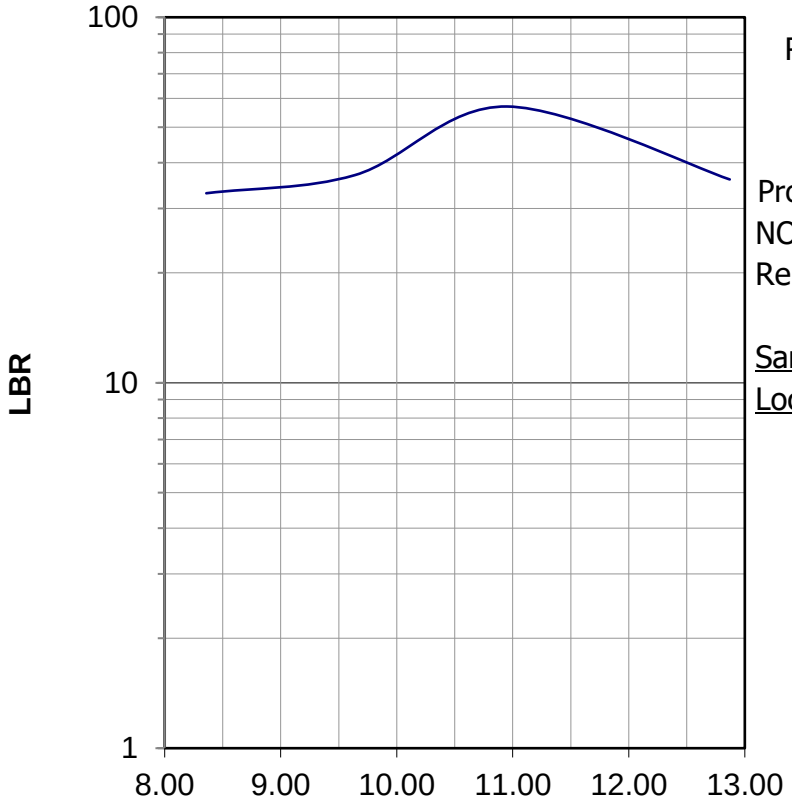


PROCTOR DATA
(FM 5-515)
Maximum Dry Density: 110.3 pcf
Optimum Moisture Content: 11.1 %
Fines Content: 6.9 %
Rammer: Mechanical
Specific Gravity (graphically): N/A
Sample Description: Brown slightly silty fine-grained SAND
Proposed Use: SUBBASE/SUBGRADE

Kyle Ferachi
Certified FDOT LBR Technician

17612 Ashley Drive
Panama City Beach, FL 32413
(850) 249-NOVA(6682)
Fax:(850) 249-6683

LBR @ 0.1" Penetration

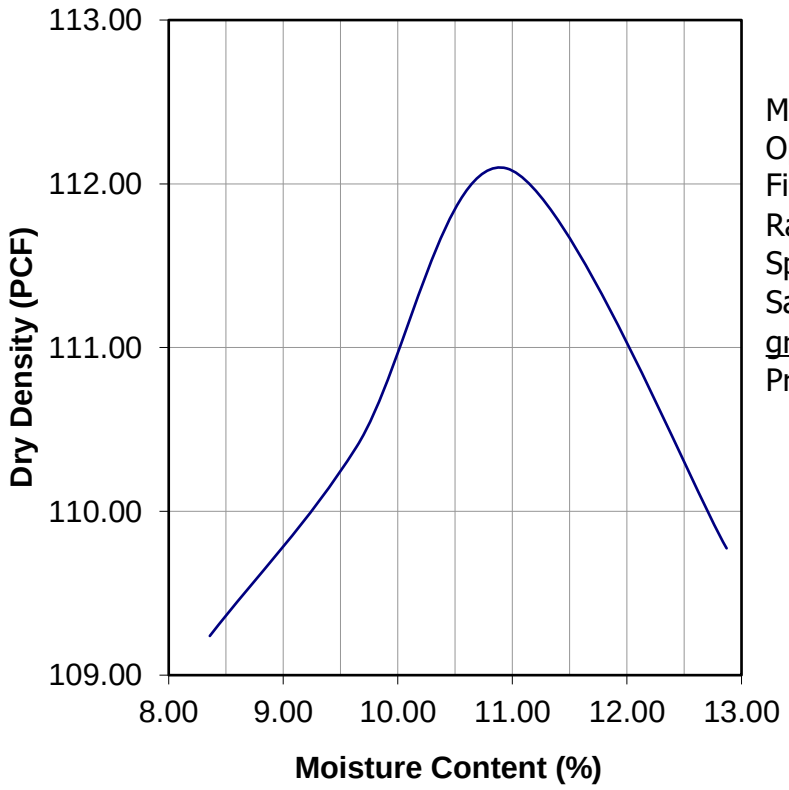


Report of Limerock Bearing Ratio (FM 5-515) and Modified Proctor ASTM D-1557, and AASHTO T-180

Project Name: DeFuniak Springs Airport Expansion
NOVA Project Number: 10111-2020054
Report Date: May 28, 2020

Sample ID: LBR-2
Location: LBR-2 (0.5' - 1.0' BEG)

LBR RESULTS
(FM 5-515)
Maximum LBR Value: 57



PROCTOR DATA
(FM 5-515)
Maximum Dry Density: 112.2 pcf
Optimum Moisture Content: 11.1 %
Fines Content: 9.4 %
Rammer: Mechanical
Specific Gravity (graphically): N/A
Sample Description: Brown slightly silty fine-grained sand
Proposed Use: SUBBASE/SUBGRADE

Kyle Ferachi
Certified FDOT LBR Technician

APPENDIX D
Support Documents

QUALIFICATIONS OF RECOMMENDATIONS

The findings, conclusions and recommendations presented in this report represent our professional opinions concerning subsurface conditions at the site. The opinions presented are relative to the dates of our site work and should not be relied on to represent conditions at later dates or at locations not explored. The opinions included herein are based on information provided to us, the data obtained at specific locations during the study, and our previous experience. If additional information becomes available which might impact our geotechnical opinions, it will be necessary for NOVA to review the information, re-assess the potential concerns, and re-evaluate our conclusions and recommendations.

Regardless of the thoroughness of a geotechnical exploration, there is the possibility that conditions between borings may differ from those encountered at specific boring locations, that conditions are not as anticipated by the designers and/or the contractors, or that either natural events or the construction process has altered the subsurface conditions. These variations are an inherent risk associated with subsurface conditions in this region and the approximate methods used to obtain the data. These variations may not be apparent until construction.

The professional opinions presented in this report are not final. Field observations and foundation installation monitoring by the geotechnical engineer, as well as soil density testing and other quality assurance functions associated with site earthwork and foundation construction, are an extension of this report. Therefore, NOVA should be retained by the owner to observe all earthwork and foundation construction to confirm that the conditions anticipated in this study actually exist, and to finalize or amend our conclusions and recommendations. NOVA is not responsible or liable for the conclusions and recommendations presented in this report if NOVA does not perform these observation and testing services.

This report is intended for the sole use of **AVCON, Inc.,** only. The scope of work performed during this study was developed for purposes specifically intended by **AVCON, Inc.,** only, and may not satisfy other users' requirements. Use of this report or the findings, conclusions or recommendations by others will be at the sole risk of the user. NOVA is not responsible or liable for the interpretation by others of the data in this report, nor their conclusions, recommendations or opinions.

Our professional services have been performed, our findings obtained, our conclusions derived and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices in the State of Florida. This warranty is in lieu of all other statements or warranties, either expressed or implied.

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical- engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply this report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by*: the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.

GEOTECHNICAL BUSINESS COUNCIL
of the Geoprofessional Business Association

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APPENDIX “B”

OWNER FURNISHED FURNITURE, FIXTURES AND EQUIPMENT (FF&E)

All other equipment shown or schedule in the Contract Documents shall be furnished and installed by the GC unless noted below:

OWNER FURNISHED FF&E ITEMS

1. Office Furniture [Desks (Non millwork or cabinetry), Free Standing Credenzas, Chairs, File Cabinets, Shelving Units (Non Millwork or cabinetry), etc.] Shown Dashed within the Architectural Floor Plans.

2. AV equipment (projectors) Televisions Sets/Flat Screen Displays [Power, AV & TV Cable Pull/Junction Boxes and Cover Plates, Installation & Blocking, Concealed Overhead Screens, Wall Brackets (Overhead or Wall Mounted) for Mounting TV’s by GC]

3. TV Cable Wiring [Pull Boxes and Plates by GC]

4. FBO COMMUNICATION Receiver Antenna & Receiver Devices. [Pull/Junction Boxes and Cover Plates by GC]

5. Airport or Tenant Computers and Computer Screens and Keyboards

6. Security/Cameras. Card Readers, and access control devices and security system elements including wiring [Door Hardware/Electrical Locks, Pull Boxes, Chase ways coordination and interface verification for automatic doors and electrical locks and Power Supply, Pull/Junction Boxes and Cover Plates by GC]

7. Free Standing Trash Receptacles [Not Scheduled]

8. Cleaning Equipment & Mop Sink Cleaning Chemical Dispensers

9. Hand Sanitizers (Installed by GC to meet ADA requirements)

10. AED Equipment (Storage Cabinet by GC)

11. AED equipment and AED training provided by Owner.

12. Tenant Equipment and FF& E items
13. Pull Down Map
14. Graphic Images for Restroom & Lobby Glassed-Murals
15. Artwork
16. Coffee Maker

END OF APPENDIX B