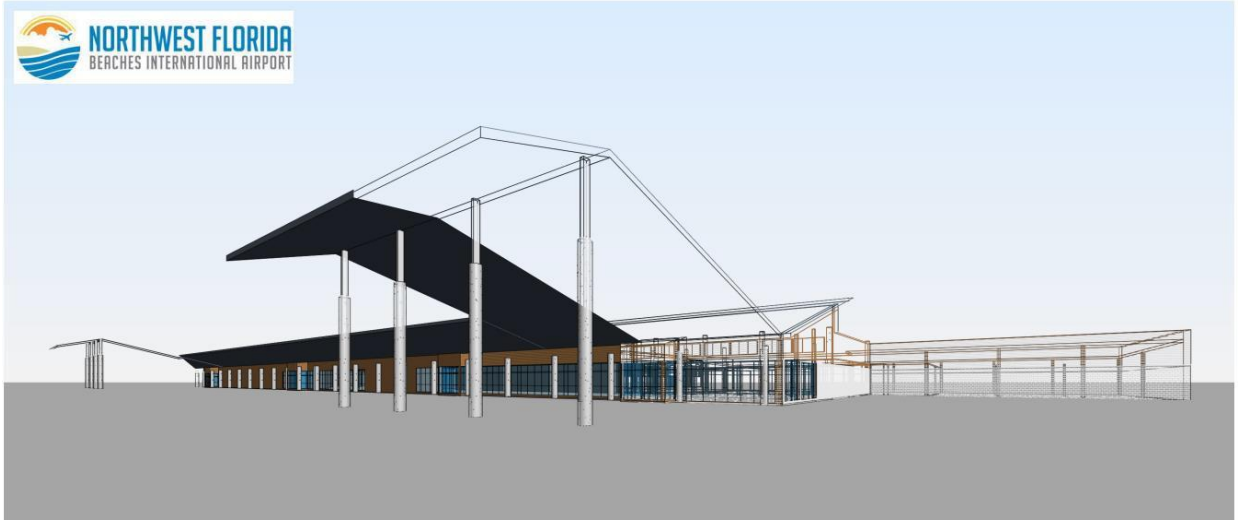
Panama City Airport – NWFBIA Baggage Expansion

PERMIT DOCUMENTS



Fitzgerald Collaborative Group, LLC
850 S. Gadsden Street
Suite 140
Tallahassee, Florida 32301

DAG Architects
455 Harrison Avenue
Suite B
Panama City, Florida 32407

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Panama City Airport - NWFBI
Baggage Expansion
Project No: 210215
6300 West Bay Parkway
Panama City, Florida 32409

Specification sections are identified by the individual disciplines in accordance with the following list. Signatures and seals indicate professional responsibility for those sections.

NT - ZHA Incorporated - (Non-Technical Specifications)
ZHA - ZHA Incorporated - (Technical Specification)
AR - Donald Gray, AIA - (Architecture)
STR Justin Duncan, PE - (Structural Engineering)
ME - David Watford, PE - (Mechanical/ Plumbing/ Fire Protection Engineering)
EL - Dan White, PE - (Electrical Engineering)
BHS -Jon Oakes - (Baggage Handling System)

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INSTRUCTIONS TO BIDDERS

BAGGAGE EXPANSION PROJECT

at the

Northwest Florida Beaches International Airport
6300 West Bay Parkway
Panama City, Florida 32409
Phone: 850-763-6751

April 15, 2022

Bid Submittal

Bidders are required to submit two (2) copies—one (1) original written submittal with manual signatures and one (1) electronic copy of the written submittal on a USB flash drive. ***Sealed bids***, subject to the conditions herein, will be ***received until 2:00 pm, Local Time, on May 17, 2022 at the Board Room for the Northwest Florida Beaches International Airport***, 6300 West Bay Parkway, 2nd Floor, Airport Terminal, Panama City, Florida 32409, (850) 763-6751, at which time bids will be publicly opened and read, for furnishing all labor and materials and performing all work connected with the Baggage Expansion project.

General Scope of Work

The scope of work will include selective demolition of existing CMU walls, paved parking, curbs, and control arm devices and wiring, sitework consisting of moving existing utilities and drainage structures, compacted fill for a new stem wall and concrete foundation, a new building addition of approximately 9,800 square feet consisting of structural steel and CMU walls to match existing, extension of storefront to match existing, ventilation, electrical and lighting, rollup doors, modification and addition to the existing baggage conveyor, and equipment with the addition of another carousel.

Bidding and Project Documents

Official copies of the Bidding and Project Documents and Bid Package are available for download from the Airport's website and may be inspected at:

Administration Offices
Northwest Florida Beaches International Airport
2nd Floor Airport Terminal
6300 West Bay Parkway,
Panama City, Florida 32409
(850) 763-6751
Web: https://www.iflybeaches.com/airport-authority/business-opportunities

Neither the Owner nor its Representative shall assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bid and Project Documents.

Pre-Bid

A non-mandatory Pre-bid meeting will be held on **Tuesday, April 26, 2022, at 2:00 pm Local Time** in the downstairs conference room at the Airport Terminal Building.

Proposed Schedule

Sunday, April 17, 2022	Release of Invitation To Bid.
Tuesday, April 26, 2022	Pre-Bid Meeting at 2:00 pm.
Friday, May 6, 2022	Deadline to submit questions up to 5:00 pm.
Tuesday, May 10, 2022	Final Addendum issued.
Tuesday, May 17, 2022	Bids due prior to 2:00 pm. Opening will occur at this time. *

*Denotes a public meeting. All meetings will be held at Airport Board Room, Panama City, Florida, and all times denote Local Time.

Questions

Questions may be submitted in written form to the Owner's Representative at the following address during the bid period between 8:00 am and 5:00 pm Local Time via email or fax or mail up and until **5:00 pm Local Time, Friday, May 6, 2022**, after which time no questions or clarifications will be received.

David Scruggs
Baggage Expansion Project
Northwest Florida Beaches International Airport
6300 West Bay Parkway, Box A
Panama City, Florida 32409
Via facsimile: (850) 785-5674 or via email: David.Scruggs@zhaintl.com

It is preferred that all communications with the airport's contact be in written form. However, if verbal communications are utilized, written confirmation of any verbal response shall dictate. All contact shall be documented and any response given shared with all potential bidders by addendum.

Addendum

Should revisions to the bidding and project documents become necessary, addenda information will be provided to those interested bidders who have requested an official copy of the Contract Documents and Bid Package. The last date for issuance of a final addendum will be on or before Tuesday, May 10, 2022, by 5:00 pm Local Time.

Bid Proposal Documents

The bid proposal must be made on the forms provided with the contract documents and submitted in the number of copies indicated in the **Bid Submittal** section. All blank spaces shall be filled in and no interlineations, alterations, or erasures of the text shall be made. Bidders must supply all required information prior to the time of bid openings.

Partial or incomplete bid proposals will not be considered. Each bid proposal shall show the full legal name and business address of the Bidder, including its street address if it differs from its mailing address and shall be signed with the usual signature of the person or persons authorized to bind the Bidder and shall be dated.

The preparation of a bid proposal shall be by and at the expense of the Bidder.

Bid proposals shall be publicly opened and read. If a Bidder's proposal contains a discrepancy between bid prices written in words and bid prices written in numbers, the price written in words shall govern.

Bid Security

Guarantee will be required with each bid as a certified check on a solvent bank or a bid bond in the amount of five (5) percent of the total amount of the bid, made payable to the Panama City–Bay County Airport and Industrial District.

Bonding Requirements
The successful bidder will be required to furnish separate performance and payment bonds each in an amount equal to 100% of the contract price.

Performance and Payment Securities
The successful Bidder shall deliver to the Owner or the Owner's Authorized Representative no later than ten (10) calendar days after contract award and prior to commencing the Work or entering the Project Site, a Performance and Payment Bond in the form supplied in the bid and project documents and executed, as surety, by a corporation acceptable to the Owner and authorized to issue such bonds in the jurisdiction of Bay County, Florida. Such Performance Bond and Payment Bond shall each be for one hundred percent (100%) of the total as set forth in Bidder's proposal. The cost of such Performance Bond and Payment Bond shall be included in the Guaranteed Maximum Price submitted in the Bidder's Proposal.

Insurance Certificates
The successful Bidder shall deliver to the Owner or the Owner's Authorized Representative no later than ten (10) calendar days after contract award and prior to commencing the Work or entering the Project Site, certificates of insurance, in the form supplied in the bid and project documents and executed, attesting to the fact that the policies of insurance required by the Bid and Project Documents have been obtained.

Sales and Use Taxes
Work under this contract is subject to the provisions of Chapter 212, Florida Statutes, Tax on State, Use and Other Transactions. Other state, local or federal taxes may be applicable. The Bidder is responsible to remit to the appropriate governmental entity all applicable taxes. Any applicable tax shall be included in the total bid price by Bidder. Owner is a public body and eligible for certain sales tax exemptions and intends to implement a Sales Tax Savings Program and the successful Bidder shall be obligated to comply with such a program.

The successful Bidder shall coordinate with the Owner relative to the direct purchase of major material items by the Owner when applicable.

Award of Contract
After consideration of price and other factors, the contract will be awarded to the Bidder whose bid proposal is determined to be the lowest responsive and responsible Bidder as determined by the Owner.

Owner reserves the right, as the interest of the Owner may require, to reject any or all bid proposals and to waive any informality in Bid Proposals received.

If the Owner intends to accept the successful Bidder's Proposal and enter into the Contract with them, Bidder acknowledges and agrees that unless and until the Owner executes the contract and returns the executed copy to the Bidder, no contract or agreement between the Owner and the Bidder shall exist. If the Owner fails to execute the contract within thirty (30) calendar days of the bid opening, the contract will be deemed withdrawn and Bidder shall be released from its Bid Proposal. The Owner shall issue a Notice to Proceed (NTP), in accordance with Florida law, within thirty (30) calendar days of the Owner's execution of the contract.

Bidder's Return of Documents
All bid and project documents which are the property of the Owner shall be returned by the unsuccessful Bidders to the address shown in the bid proposal invitation to which the bid proposals were submitted or destroyed.

ATTACHMENTS
Attachment 1: Bid Document Forms

1. Bid Proposal
2. Bid Bond Form
3. Public Entity Crimes Statement
4. DBE Program
5. Davis-Bacon Certification
6. Drug Free Workplace Certification
7. Non-Segregated Facilities Certification
8. Buy American Clause
9. Trench Safety Act Certification
10. Form of Non-Collusion Affidavit
11. E-Verify Compliance Certification
12. Construction Contract
13. Payment & Performance Bond Forms
14. Certification of Attorney
15. Release of Liens
16. Advertisement of Completion

Attachment 2: Insurance Certificate

PROJECT DOCUMENTS
NWFBIA General Conditions
NWFBIA Special Conditions
Project Technical Specifications
Contract Drawings

NORTHWEST FLORIDA BEACHES INTL. AIRPORT
PANAMA CITY–BAY COUNTY AIRPORT AND INDUSTRIAL DISTRICT

Baggage Expansion Project

In response to the Bid and Project Documents dated **15 day** of **April, 2022**, and in accordance with the "Notice and Instructions to Bidders", the undersigned hereby proposes to furnish all plant, labor, technical and professional services, supervision, materials and equipment, and to perform all operations necessary and required to complete the **Baggage Expansion Project** at Northwest Florida Beaches International Airport located in Bay County, Florida, in accordance with provisions of the Request for Bid and Project Documents and any addenda thereto, and at the prices stated opposite the respective items set forth in the Schedule of Prices attached hereto.

The undersigned agrees that this Bid Proposal constitutes a firm offer to Owner which cannot be withdrawn for **120** calendar days from and after the due date or until a contract for the Work is executed by the undersigned and Owner, whichever is earlier. The undersigned's execution of the Bid Affidavit (copy attached), the Non-Collusion Affidavit (copy attached), the Sworn Statement under Section 287.133 (3)(A), Florida Statutes, Public Entity Crimes Statement (copy attached), must be witnessed and notarized by a Notary and returned with this Bid Proposal in order that the Bid Proposal be considered. Further, the Drug Free Workplace Certification (copy attached), Certification of Non-Segregated Facilities (copy attached), and Buy America Certification (copy attached) must also be completed and returned as part of the Bid Proposal.

The undersigned certifies that it has examined and is fully familiar with all of the provisions of the Bid and Project Documents and any addenda thereto; that it has carefully checked all the words and figures shown in its Schedule of Prices, if any required; that it has carefully reviewed the accuracy of all statements in this Bid Proposal and attachments hereto; and that it has by careful examination of the Bid and Project Documents and any addenda thereto and by examination of the actual site conditions, satisfied itself as to the nature and location of all work, the general and local conditions to be encountered in the performance of any work, the requirements of the Contract and all other matters which can in any way affect the Work or the cost thereof. The undersigned hereby agrees Owner shall not be responsible for any errors or omissions on the part of the undersigned in preparing this Bid Proposal.

If awarded a Contract, the undersigned agrees to execute the Contract and deliver it to Owner within ten (10) calendar days after contract award with the Certificates of Insurance and Payment Securities as required.

The undersigned hereby acknowledges that any contract resulting from this Bid Proposal will represent the entire agreement and that any exceptions taken in this Bid Proposal, may be a basis for Owner rejecting such Bid Proposal.

The undersigned also acknowledges receipt, understanding and full consideration of the following addenda to the Bid and Project Documents. (Contractor shall enter Addenda number and initial next to addenda received.)

Addendum No._____ Signature_____

Addendum No._____ Signature_____

Addendum No._____ Signature_____

Addendum No._____ Signature_____

Addendum No._____ Signature_____

Bidder:_____

Signed by: _____

Typed Name:_____

Title: _____

Bidder's Address: _____

State/Country of Incorporation (if applicable):_____

Bidder's Contractor License No. _____

License Expiration Date:_____

Bid Proposal Date: _____

If Bidder is a corporation, enter State/Country of Incorporation in addition to Business Address. Evidence of the authority of the person signing on behalf of the bidding entity shall be attached to the Bid Proposal. If a joint venture, consortia, or partnership attach evidence of the signatory's authority signed by and listing the full names of all partners or joint venture(s) that shall be jointly and severally liable.

BID AFFIDAVIT

The following affidavit must be executed in order that your Bid Proposal may be considered.

State of _____, County of_____
of lawful age, being first duly sworn, upon his oath deposes and says: That he executed the accompanying Bid Proposal on behalf of the Contractor therein named, and that he had lawful authority so to do, and said Contractor has not directly or indirectly, entered into any agreement, expressed or implied, with any Contractor or Contractors, having to its object the controlling of the price or amount of such quotation or any quotations, the limiting of the Bid Proposal or Contractors, the parceling or farming out to any Contractor or Contractors, to other persons of any part of the contract or any of the subject matter or the Bid Proposals, or of the profits thereof, and that he has not and will not divulge the sealed Bid Proposal to any person whomsoever, except those having a partnership or other financial interest with him in said Bid Proposal or Proposals, until after the sealed Bid Proposal or Proposals are opened.

Signature:_____

Date:_____

State of _____ County of_____

PERSONALLY APPEARED BEFORE ME, the undersigned authority,

_____
(name of individual signing)

Who, after first being sworn by me, affixed his/her signature in the space provided above on this

_____ day of _____ , 20__.

Subscribed and sworn to before me this ____ day of _____ , 20__.

My Commission Expires:_____ _____
Notary Public

BID FORM

CONTRACTOR: _____ DATE: _____

AIRPORT NAME: Northwest Florida Beaches International Airport
PROJECT DESCRIPTION: Baggage Expansion Project

BID SCHEDULE – UNIT PRICES

Base Bid – Civil Pay Items

Bid Item No.	Pay Item No.	Item Description & Unit Price In Words	Unit	Estimated Quantity	Unit Price	Total Amt./ Item
1	101-1	Mobilization _____ dollars and _____ cents	LS	1		
2	102-1	Maintenance of Traffic _____ dollars and _____ cents	LS	1		
3	104-1	Prevention, Control, and Abatement of Erosion and Water Pollution _____ dollars and _____ cents	LS	1		
4	110-1	Clearing and Grubbing _____ dollars and _____ cents	LS	1		
5	110-2	Miscellaneous Demolition _____ dollars and _____ cents	LS	1		

Bid Item No.	Pay Item No.	Item Description & Unit Price In Words	Unit	Estimated Quantity	Unit Price	Total Amt./ Item
6	110-3	1" Asphalt Milling _____ dollars and _____ cents	SY	260		
7	120-1	Unclassified Excavation and Embankment _____ dollars and _____ cents	CY	925		
8	160-1	12" Stabilized Subbase _____ dollars and _____ cents	SY	210		
9	285-1	8" Limerock Base Course _____ dollars and _____ cents	SY	200		
10	334-1	2.5" Superpave Asphaltic Concrete _____ dollars and _____ cents	TON	35		
11	334-2	1" Superpave Asphaltic Concrete _____ dollars and _____ cents	TON	30		
12	425-1	FDOT Type 'P' Alt. B Bottom w/ Solid Grate _____ dollars and _____ cents	EA	1		

Bid Item No.	Pay Item No.	Item Description & Unit Price In Words	Unit	Estimated Quantity	Unit Price	Total Amt./ Item
13	425-2	FDOT Type 'C' DBI _____ dollars and _____ cents	EA	2		
14	425-3	FDOT Type 'F' DBI _____ dollars and _____ cents	EA	1		
15	430-1	6" ADS, N-12 Pipe _____ dollars and _____ cents	LF	50		
16	430-2	18" ADS, N-12 Pipe _____ dollars and _____ cents	LF	165		
17	520-1	F-Curb _____ dollars and _____ cents	LF	150		
18	520-2	E-Curb _____ dollars and _____ cents	LF	75		
19	522-1	Concrete Sidewalk (6") _____ dollars and _____ cents	SY	540		
20	550-1	Fence Improvements _____ dollars and _____ cents	LF	90		

Bid Item No.	Pay Item No.	Item Description & Unit Price In Words	Unit	Estimated Quantity	Unit Price	Total Amt./ Item
21	570-1	Sodding _____ dollars and _____ cents	SY	500		
22	710-1	Pavement Markings _____ dollars and _____ cents	LS	1		

FOR ALL WORK REQUIRED 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 BASE BID AMOUNT OF:

TOTAL BASE BID - CIVIL (amount in words):

_____Dollars and

_____cents

($_____)
amount in numbers

Note: Total Base Bid - Civil amount shall equal the sum of the totals for Bid Items No. 1 through 22.

Work To Be Performed: The Work to be performed by Contractor comprises the furnishing of all professional and technical services, labor, equipment, materials, and all other functions and operations including, but not limited to, temporary construction facilities, equipment, materials and supplies and related services, and surveying as necessary and required to accomplish the **Baggage Expansion Project** work all strictly in accordance with all requirements of the Bid and Project Documents.

BID SUMMARY:

A. Base Bid – Building Expansion

_____ ($ _____)

B. Bag Make-up Equipment and Installation: (includes 1-year Equipment Warranty Period)

_____ ($ _____)

C. Base Bid – Civil Pay Items:

_____ ($ _____)

D. Additive Alternate Bid No. 1: Increase Equipment Warranty Period to 3 years

_____ ($ _____)

E. Total Bid Amount:

_____ ($ _____)

Number of days to complete the Work: _____

** The Total Bid Amount (D) shall equal the sum of (A) through (C).* ***The Basis of Award shall be on the base bid plus the alternate, at the Owner's sole discretion.*** *Any award may or may not include the Bid Alternate 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 opening 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.

Unit Prices, if any:
Unit prices for changes shall be full and complete compensation for the work or changes to the work. Prices will be inclusive of all costs including, but not limited to, labor, materials, services, overhead, and profit.

Unit Pricing: (written pricing for areas noted per unit) Adjustments:
All prices are fixed for the duration of the Contract and are not subject to escalation for any cause. Payment of the Total Contract Price shall constitute full payment for performance of the Work and covers all costs of whatever nature incurred by Contractor in accomplishing the Work in accordance with the provisions of the Contract.

Contractor shall maintain all work in progress until it is accepted. Contractor shall repair, rework, or replace as necessary any work damaged or lost due to normal wear and tear, anticipated events, or conditions within its control. No separate payment shall be made for such maintenance costs which are deemed included in the original contract price. Any failure to maintain the Work shall be considered a defect in accordance with the General Conditions.

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.

Required Submittals: The following submittals are a prerequisite to the initial payment:

1. Contract Schedule,
2. Payment Securities,
3. Insurance Certificates,
4. Schedule of Values,
5. Maintenance Plan.

Bidders' Representations: The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bid and Project Documents; to complete all Work as specified or indicated in the Project Documents for the Contract Price and within the Contract Time indicated in the Agreement and in accordance with the Project Documents.

SIGNATURE/EXECUTION

Dated and signed at _____, this _____ day of _____, 20__.

_____
(Name of Bidder)

_____
(Authorized Signature)

_____
(Title)

_____
(Mailing Address)

_____
(City, State, Zip)

_____
(Federal ID No. or SS No.)

State of _____ County of_____

PERSONALLY APPEARED BEFORE ME, the undersigned authority,

(name of individual signing)

Who, after first being sworn by me, affixed his/her signature in the space provided above on this

_____ day of _____ , 20__.

Subscribed and sworn to before me this ____ day of _____ , 20__.

My Commission Expires:_____ _____
Notary Public

ATTACH BID FORMS

BID BOND

CONTRACTOR *(Name and Address):*

_____

_____

_____

SURETY *(Name and Address of Principal Place of Business)*:

_____

_____

_____

OWNER *(Name and Address)*:

Owner: Panama City – Bay County Airport and Industrial District
Address: 6300 West Bay Parkway
Panama City Beach, FL 32409

BID:

BID DUE DATE: May 17, 2022 at 2:00 pm
PROJECT *(Brief Description Including Location):* The Work to be performed by Contractor comprises the furnishing of all professional and technical services, labor, equipment, materials, and all other functions and operations including, but not limited to, temporary construction facilities, equipment, safety, materials and supplies and related services, and surveying as necessary and required to accomplish the Baggage Expansion project strictly in accordance with all requirements of the Bid Package and Contract Documents.
Northwest Florida Beaches International Airport, Panama City, Florida

BOND:

BOND NUMBER: _____
DATE: *(Not later than Bid Due Date):* _____
PENAL SUM: _____

IN WITNESS WHEREOF, Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR	SURETY
_____(Seal)	_____(Seal)
Contractor's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	By: _____
Signature and Title	Signature and Title (Attach Power of Attorney)
Attest: _____	Attest: _____
Signature and Title	Signature and Title

Note: (1) Above addresses are to be used for giving required notice.
(2) Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

EJCDC NO. 1910-28-C (1990 Edition)

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to OWNER upon default of Contractor the penal sum set forth on the face of this Bond.

2. Default of Contractor shall occur upon the failure of Contractor to deliver within the time required by the Project Documents the executed Agreement required by the Project Documents and any performance and payment bonds required by the Project Documents and Contract Documents.

3. This obligation shall be null and void if:

   3.1. OWNER accepts Contractor's Bid and Contractor delivers within the time required by the Project Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Project Documents and any performance and payment bonds required by the Project Documents and Contract Documents, or

   3.2. All Bids are rejected by OWNER, or

   3.3. OWNER fails to issue a notice of award to Contractor within the time specified in the Project Documents (or any extension thereof agreed to in writing by Contractor and, if applicable, consented to by Surety when required by paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default of Contractor and within 30 calendar days after receipt by Contractor and Surety of written notice of default from OWNER, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of and any and all defenses based on or arising out of any time extension to issue notice of award agreed to in writing by OWNER and Contractor, provided that the time for issuing notice of award including extensions shall not in the aggregate exceed 120 days from Bid Due Date without Surety's written consent.

6. No suit or action shall commence under this Bond prior to 30 calendar days after the notice of default required in paragraph 4 above is received by Contractor and Surety, and in no case later than one year after Bid Due Date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notice required hereunder shall be in writing and sent to Contractor and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal deliver, commercial courier or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent or representative who executed this Bond on behalf of Surety to execute, seal and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted form this Bond shall be deemed to be included herein as if set forth at length. If any provision of any Bond conflicts with any applicable provision of any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

SWORN STATEMENT UNDER SECTION 287.133 (3)(a)
FLORIDA STATUTES ON PUBLIC ENTITY CRIMES

THIS FORM MUST BE SIGNED AND SWORN IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICAL AUTHORIZED TO ADMINISTER OATH.

1. This sworn statement is submitted to Panama City – Bay County Airport and Industrial

District by _____ (print individuals name and title)

for _____ (print name

of entity submitting sworn statement) whose business is _____

_____ and (if applicable) its Federal Employer Identification No. (FEIN) is _____ (if entity has no FEIN, include the Social Security No. of the individual signing this sworn statement).

2. I understand that a "public entity crime" as defined in Paragraph 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 of 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.

3. 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 crime, 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.

4. I understand that an "affiliate" as defined in Paragraph 287.133(1)(a), Florida Statutes, means:

A. A predecessor or successor of a person convicted of a public entity crime; or

B. An entity under the control of any natural person, who is active in the management of the entity and who has been convicted of a public entity crime. The "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 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 36 months shall be considered an affiliate.

5. I understand that a "person" as defined in Paragraph 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, and employees, members, and agents who are active in management or an entity.

6. Based on information and belief, the statement which I have marked below is true and in relation to the entity submitting this sworn statement. **(Indicate which statement applies.)**

____Neither the entity submitting this sworn statement, nor any of its officers, directors, executives, partners, shareholders, employees, members or agents who are active in the management of the entity, nor any 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 its officers, directors, executives, partners, shareholders, employees, members or agents who are active in the management of the entity, or any 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 its officers, directors, executives, partners, shareholders, employees, members or agents who are active in the management of the entity, or any 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 a Hearing Officer of the State of Florida, Division of Administrative Hearings and the Final Order entered by the Hearing Officer determined that it was not in the public interest to place the submitting this sworn statement on the convicted vendor list. **(Attach a copy of the final order).**

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR THE PUBLIC ENTITY INDENTIFIED IN PARAGRAPH 1 (ONE) ABOVE IS FOR THAT PUBLIC ENTITY ONLY AND, THAT HIS 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 PUBLIC ENTITY PRIOR TO ENTERING INTO A CONTRACT IN EXCESS OF THE THRESHOLD AMOUNT PROVIDED IN SECTIO 287.107, FLORIDA STATUTES FOR CATEFORY TWO ON ANY CHANCE IN THE INFORMATION CONTAINED IN THIS FORM.

_____
(Signature)

_____
(Date)

STATE OF _____ COUNTY OF _____

PERSONALLY APPEARED BEFORE ME, the undersigned authority,

_____
(Name of individual signing)

Who, after first being sworn by me, affixed his/her signature in the space provided above on this _____ day of _____, 20___.

Subscribed and sworn to before me this _____ day of _____, 20___.

My Commission Expires:

_____ _____
Notary Public

DISADVANTAGED BUSINESS ENTERPRISE PROGRAM

The following bid condition applies to this U.S. Department of Transportation (DOT) assisted contract. Submission of a bid/proposal by a prospective contractor shall constitute full acceptance of these bid conditions.

1. **DEFINITION -** Disadvantaged Business Enterprise (DBE) as used in this contract shall have the same meaning as defined in 49 CFR Part 26.

2. **POLICY -** It is the policy of DOT that DBE's as: defined in 49 CFR Part 26 shall have the maximum opportunity to participate in the performance of contracts and subcontracts financed in whole or in part with Federal funds. Consequently, the DBE requirements of 49 CFR Part 26 apply to this contract.

3. **OBLIGATION -** The contractor agrees to ensure that DBE's as defined in 49 CFR Part 26 have the maximum opportunity to participate in the performance of contracts and subcontracts financed in whole or in part with Federal funds. In this regard, all contractors shall take all necessary and reasonable steps in accordance with 49 CFR Part 26 to ensure that DBE's have the maximum opportunity to compete for and perform contracts. Contractors shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of DOT assisted contracts.

4. **COMPLIANCE -** All bidders, potential contractors, or subcontractors for this DOT assisted contract are hereby notified that failure to carry out the DOT policy and the DBE obligation, as set forth above, shall constitute a breach of contract which may result in termination of the contract or such other remedy as deemed appropriate by the owner.

5. **CONTRACT CLAUSE -** All bidders and potential contractors hereby assure that they will include the above clauses in all subcontracts, which offer further subcontracting opportunities.

6. **CONTRACT AWARD -** Bidders are hereby advised that meeting the DBE subcontract goal or making an acceptable good faith effort to meet said goal are conditions of being awarded this DOT assigned contract.

   The owner proposes to award the contract to the lowest responsive and responsible bidder submitting a reasonable bid provided he has met the goal for DBE participation or, if failing to meet the goal, he has made an acceptable good faith effort to meet the established goal for DBE participation. Bidder is advised that the owner reserves the right to reject any or all bids submitted.

7. **DBE PARTICIPATION GOAL -** The attainment of the goal established for this contract is to be measured as a percentage of the total dollar value of the contract. The DBE goal established for this contract is **6.30%.**

8. **AVAILABLE DBE'S -** The owner has on file a DBE program pending approved by the Federal Aviation Administration. This program contains a listing of DBE's (certified and uncertified). Bidders are encouraged to inspect this list to assist in locating DBE's for the work. Other DBE's may be added to the list in accordance with the owner's approved DBE program. Credit toward the DBE goal will not be counted unless the DBE to be used can be certified by the owner.

9. **CONTRACTOR'S REQUIRED SUBMISSION -** The owner requires the submission of the following information with the bid:

DISADVANTAGED BUSINESS ENTERPRISE PROGRAM

MBEs

MBE Subcontractors Names/Addresses/ Identity	Subcontract Work Item	Dollar Value of Subcontract Work

WBEs

Women Subcontractors Names/Addresses/ Identity	Subcontract Work Item	Dollar Value of Subcontract Work

OSEs

Other Socially and Economically Disadvantaged Subcontractors within the DBE Group Names/Addresses/ Identity	Subcontract Work Item	Dollar Value of Subcontract Work

Total Dollar Value of Subcontract Work _____
Total Dollar Value of Basic Bid _____
Total DBE Percent **%** _____

*(Black, Hispanic, Asian American, American Indian, and other economically disadvantaged.)

If the Contractor fails to meet the contract goal established in Section 7 above, the following information must be submitted prior to contract award to assist the owner in determining whether or not the contractor made acceptable good faith efforts to meet the contract goal. This information (when applicable), as well as the DBE information, should be submitted as specified in Section 9 above.

Suggested guidance for use in determining if good faith efforts were made by a contractor are included in 49 CFR Part 26.

A list of the efforts that a contractor may make, and the owner may use, in making a determination as to the acceptability of a contractor's efforts to meet the goal as included in 49 CFR Part 26 are as follows:

a. Whether the contractor attended any pre-solicitation or pre-bid meetings that were scheduled by the recipient to inform DBE's of contracting and subcontracting opportunities;

b. Whether the contractor advertised in general circulation, trade association, and minority-focus media concerning the subcontracting opportunities;

c. Whether the contractor provided written notice to a reasonable number of specific DBE's that their interest in the contract was being solicited in sufficient time to allow the DBE's to participate effectively;

d. Whether the contractor followed up initial solicitations of interest by contacting DBE's to determine with certainty whether the DBE's were interested;

e. Whether the contractor selected portions of work to be performed by DBE's in order to increase the likelihood of meeting the DBE goal (including, where appropriate, breaking down contracts into economically feasible units to facilitate DBE participation);

f. Whether the contractor provided interested DBE's with adequate information about the plans, specifications, and requirements of the contract;

g. Whether the contractor negotiated in good faith with interested DBE's, not rejecting DBE's as unqualified without sound reasons based on a thorough investigation of their capabilities.

h. Whether the contractor made efforts to assist interested DBE's in obtaining bonding, lines of credit, or insurance required by the recipient or contractor;

and

i. Whether the contractor effectively used the services of available minority community organizations; minority contractors' groups; local and state Federal Minority Business Assistance Offices; and other organizations that provide assistance in the recruitment and placement of DBE's.

NOTE: The nine items set forth above are merely suggested criteria and the owner may specify that you submit information on certain other actions a contractor took to secure DBE participation in an effort to meet the goals. A contractor may also submit to the owner other information on efforts to meet the goals.

10. CONTRACTOR ASSURANCE - The bidder hereby assures that he will meet one of the following as appropriate:

a. The DBE participation goal as established in the General Conditions.

b. The DBE participation percentage as shown in Section 9, which was submitted as a condition of contract award.

Agreements between bidder/proposer and a DBE in which the DBE promises not to provide subcontracting quotations to other bidders/proposers are prohibited. The bidder shall make a good faith effort to replace a DBE subcontract that is unable to perform successfully with another DBE subcontractor. Substitution must be coordinated and approved by the owner.

The bidder shall establish and maintain records and submit regular reports, as required, which will identify and assess progress in achieving DBE subcontract goals and other DBE affirmative action efforts.

11. PROMPT PAYMENT - The prime contractor agrees to pay each subcontractor under this prime contract for satisfactory performance of its contract no later than **10** days from the receipt of each payment the prime contractor receives from the owner. The prime contractor agrees further to return retainage payments to each subcontractor within **10** 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 owner. This clause applies to both DBE and non-DBE subcontractors.

NORTHWEST FLORIDA BEACHES INTERNATIONAL AIRPORT

PANAMA CITY-BAY COUNTY AIRPORT & INDUSTRIAL DISTRICT
MONTHLY REPORT OF SUBCONTRACTOR PARTICIPATION

Name of Prime Contractor _____ Contract Name/Number/Description _____
Original Contract Amount _____ Payments Received _____
Current Contract Amount _____ Retainage Withheld _____
Original Contract DBE Participation _____ Invoice Period From: _____ To: _____
Actual DBE Participation to Date _____ Percentage Original Contracted DBE 0.00%
Current Scheduled DBE Participation _____ Participation Date Report Submitted _____

PLEASE COMPLETE INFORMATION BELOW. ATTACH ADDITIONAL SHEETS IF NECESSARY.

#	SUBCONTRACTOR NAME & ADDRESS	BRIEF DESCRIPTION OF WORK	NAICS CODE	DBE *	MBE	SBE	WBE	OTHER	ORIGINAL SUBCONTRACT AMOUNT	CURRENT SUBCONTRACT AMOUNT	TOTAL PAYMENTS TO DATE	AMOUNT INVOICES THIS MONTH	TOTAL INVOICED TO DATE THIS PROJECT	PERCENT COMPLETE	PERCENT OF PAYMENTS TO DBE
DBEs SUBCONTRACTORS ONLY															
1				☐	☐	☐	☐	☐						0.00%	0.00%
				Comments:											
2				☐	☐	☐	☐	☐						0.00%	0.00%
				Comments:											
3				☐	☐	☐	☐	☐						0.00%	0.00%
				Comments:											
4				☐	☐	☐	☐	☐						0.00%	0.00%
				Comments:											
5				☐	☐	☐	☐	☐						0.00%	0.00%
				Comments:											
			SUBTOTAL - DBEs						$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00		
NON-DBE SUBCONTRACTORS															
1				☐	☐	☐	☐	☐						0.00%	0.00%
				Comments:											
2				☐	☐	☐	☐	☐						0.00%	0.00%
				Comments:											
3				☐	☐	☐	☐	☐						0.00%	0.00%
				Comments:											
4				☐	☐	☐	☐	☐						0.00%	0.00%
				Comments:											
5				☐	☐	☐	☐	☐						0.00%	0.00%
				Comments:											
			SUBTOTAL - NON-DBEs						$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00		
			ALL SUBCONTRACTOR TOTALS						$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00		

* CHECK THIS COLUMN ONLY IF SUBCONTRACTOR IS A CERTIFIED DBE UNDER FEDERAL REGULATIONS, 49 CFR PART 26.

I certify that the information furnished above is correct to the best of my knowledge and represents the current status of the firm's (Prime Contractor) subcontract(s) with the listed firms (Subcontracts) for the designated period covered by this report.

Signed: _____ Title: _____

Print Name: _____ Date: _____

Reset Save

PANAMA CITY-BAY COUNTY AIRPORT & INDUSTRIAL DISTRICT
INSTRUCTIONS AND FORM FOR COMPLETING THE
MONTHLY REPORT OF SUBCONTRACTOR PARTICIPATION

I. USE AUTHORIZED FORMS

These instructions and the approved form "Monthly Report of Subcontractor Participation" are to be used to file monthly reports of subcontractor participation. Do not change or amend the instructions or form in any manner. These documents are available in hard copy or electronically from the Commission's DBELO, Darlene Nelson.

II. TOP PORTION OF FORM

Original Contract Amount. Enter the original amount of the Prime's Contract.

Current Contract Amount. Enter the current amount of the Prime's Contract. If this amount is the same as the entry in "Original Contract Amount", enter it. If this amount is different than the amount entered in "Original Contract Amount", enter the new contract amount.

Invoice Period. Enter the monthly period being reported (e.g., January 1, 20xx to January 31, 20xx). Each report must cover a full month.

Actual DBE Participation to Date. Enter the sum of "Total Payments to Date" made to DBEs as of the date of the report.

Current Scheduled DBE Participation. Enter the sum of "Current Subcontract Amounts" reported for **DBEs only**, i.e, do NOT include current subcontract amounts for non-DBEs even though they appear in the ledger portion of the report.

Total Original Contracted DBE Participation. Enter the original dollar amount of DBE participation. This must be the same dollar amount submitted on the Original Letter of Intent and approved by the District, and that is reported in the ledger portion of the report under "Original Subcontract Amount".

Payments Received. Enter the sum of total of payments received by the Prime Contractor as of the date of the report.

Retainage Withheld. Enter the amount of retainage withheld as of the date of the report. If none, enter 0.

Date Submitted. Enter the date the report is submitted to the District.

Percentage Original Contracted Participation. Enter the original percentage of DBE participation for this contract. This must be the same percentage committed to in the Prime Contractor's proposal and approved by the District.

IMPORTANT NOTE: The Monthly Report of Subcontractor Participation must be attached to each invoice submitted by the Prime Contractor. If an invoice is not being submitted in a particular month, the Monthly Report of Subcontractor Participation must still be submitted each month. The due date of the monthly report is the 15th day of the following month.

III. LEDGER PORTION

Report all subcontractors every month and complete all required information. Please note that some entries

apply only to the sum of DBE contracts. To facilitate accuracy in reporting, the DBE subcontractors section is listed first along with a subtotal and the Non-DBE contracts appear in the second section of the report. If there is no invoice activity for a DBE in any given month, enter "0" in the column, "Amount This Invoice". All other information must be entered, and must be current and correct.

Subcontractor Name and Address. For all subcontractors, enter the subcontractor's name and business address (street address, city, state and zip code). For DBEs, these entries must be the same as comparable information appearing on the original Letter of Intent and the Contract Participation Form/DBE Program Form submitted with the prime contractor's proposal.

Description of Work and NAICS Code. Enter a brief description (e.g., painting, electrical, survey, etc.) of the work each subcontractor is performing and the associated NAICS Code for that work. For DBEs, these entries must be the same as comparable information appearing on the Letter of Intent and the Contract Participation Form/DBE Program Form submitted with the prime contractor's proposal.

Classification of Subcontractor(s). Assign classifications as follows:

DBE-Place an "X" in this column only if the subcontractor has been DBE certified by the Florida Department of Transportation ("FDOT"). Only those subcontractors who have meet the DBE eligibility requirements of 49 CFR Part 26 may be classified as DBEs.

MBE-Place an "X" in this column if the subcontractor is also an FDOT certified minority-owned company. This classification should also be used for subcontractors who have submitted a DBE certification application but have not yet been certified as a DBE. Once DBE certification has been achieved, such firms should be classified as both MBE and DBE.

SBE-Place an "X" in this column if the subcontractor is an FDOT certified small business that has 250 or fewer employees and meets the definition of the Small Business Administration regulations (13 CFR Part 121). This classification should also be used for subcontractors who have submitted a SBE certification application but have not yet been SBE certified. Once certification has been achieved, such firms should be classified only as SBE.

WBE-Place an "X" in this column if the subcontractor is an FDOT certified woman-owned company. This classification should also be used for subcontractors who have submitted a DBE certification application but have not yet been certified as a DBE. Once DBE certification has been achieved, such firms should be classified as both WBE and DBE.

OTHER-Place an "X" in this column for all subcontractors who cannot be classified as either DBE, MBE, WBE or SBE.

Original Subcontract Amount. Enter the original subcontract amount for each subcontractor. For DBEs, this must be the **amount listed on the Original Letter of Intent or the Contract Participation Form/DBE Program Form** submitted for DBEs with the prime contractor's proposal, or the amount listed on the proposal in the Disadvantaged Business Enterprise Program, and approved by the District.

Current Subcontract Amount. Enter the current subcontract amount. If this amount is the same as the entry in "Original Subcontract Amount", enter it. For DBEs, **if this amount is different** than the amount entered in "Original Subcontract Amount", a **Revised Letter of Intent must be on file with and approved by the District**. It is recommended that Revised Letters of Intent be submitted with the Monthly Report of Subcontractor Participation that initially reports the new contract amount.

Total Payments to Date. Enter the sum of payments that have been made to each subcontractor as of the date of the report. This column should not contain diminishing amounts, i.e., a succeeding month's entry lower than the preceding month's entry. If this occurs, the District may request an examination of additional records to verify the correct amount.

Amount of This Invoice. Enter the amount of the subcontractor's invoice being submitted with this report.

Total Invoiced to Date. Enter the total amount invoiced as of the date of the report. This column should not contain diminishing amounts, i.e., a succeeding month's entry lower than the preceding month's entry. If this occurs, the District may request an examination of additional records to verify the correct amount.

Percentage Complete. Enter the percentage that equals the progress of that subcontractor's work.

Percent DBE. This entry depends upon the type of contract and terms stated in the solicitation. The **percentage for non-DBEs is always "0"**. Thus, if the subcontractor does not meet the requirements stated above to be classified as a DBE, the percentage entered in this column **must be "0"**.

DAVIS-BACON CERTIFICATION

This is to certify that I have reviewed the minimum rate wages contained in Special Provision No. 9, which were predetermined for this project by the Secretary of Labor, and I have used these rates in the preparation of this proposal. Furthermore, I agree to abide by these wages and all other provisions of the Davis-Bacon Act as it associates to this project.

_____ _____
Bidder's Signature Date

_____ _____
Title Notary Public

DRUG-FREE WORKPLACE CERTIFICATION

THE BELOW SIGNED BIDDER CERTIFIES that it has implemented a drug-free workplace program. In order to have a drug-free workplace program, a business shall:

1. Publish a statement notifying employees that the unlawful manufacture, distributing, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.
2. Inform employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.
3. Give each employee engaged in providing the commodities or contractual services that are under bid a copy of the statement specified in subsection 1.
4. In the statement specified in subsection 1, notify the employees that, as a condition of working on the commodities or contractual services that are under bid, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, to any violation of Chapter 893 or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) days after such conviction.
5. Impose a sanction on or require the satisfactory participation in drug abuse assistance or rehabilitation program if such is available in the employee's community, by any employee who is convicted.
6. Make a good faith effort to continue to maintain a drug-free workplace through implementation of this section.

As the person authorized to sign this statement, I certify that this firm complies fully with the above requirements.

DATE: _____

COMPANY: _____ SIGNATURE: _____

ADDRESS: _____ NAME: _____
(Typed or Printed)

_____

_____ TITLE: _____

PHONE #: _____

CERTIFICATION OF NON-SEGREGATED FACIITIES

(Must be completed and submitted with the Bid)

The Bidder certifies that it does not maintain or provide for its employee any segregated facilities at any segregated facilities at any of its establishments, and that it does not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Bidder certifies further that it will not maintain or provide for its employees segregated facilities at any of its establishments, and that it will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Bidder 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 room, work areas, restrooms and washrooms, restaurants and other eating 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 basis of race, color, religion, or national origin, because of habit, local customs, or any other reason. The Bidder agrees that (except where it has obtained identical certification from proposed subcontractors for the specific time period) it will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of the equal opportunity clause, and that it will retain such certification in its files.

_____
(Name of Bidder)

_____
(Signature)

_____
(Title)

_____
(Dated)

BUY AMERICAN CERTIFICATION

Except for those items listed by the Bidder below or on a separate and clearly identified attachment to this Bid, the Bidder hereby certifies that steel and each manufactured product, is produced in the United States (as defined in the Special Provisions under this section entitle Buy American-Steel and Manufactured Products) and that components of unknown origin are considered to have been produced or manufactured outside the United States.

PRODUCT	COUNTY OF ORIGIN

_____
(Name of Bidder)

By: _____

Title: _____

Dated: _____

TRENCH SAFETY ACT CERTIFICATION

(Under Chapter 553, Florida Statutes)

Bidder recognizes that this Contract includes work for trench excavation in excess of five feet deep. Bidder acknowledges the requirement set forth in Section 553.63 of the Florida Statutes titled Trench Safety Act. Bidder certifies that the required trench safety standards will be in effect during the period of construction of the Project and Bidder agrees to comply with all such required trench safety standards.

The amount of _____dollars ($) has been separately identified for the cost of compliance with the required trench safety standards; said amount is included within the Contract Price.

FORM OF NON-COLLUSION AFFIDAVIT

State of _____

County of _____

_____ being first duly

sworn, deposes and says that he/she is _____

(Sole owner, a partner, president, secretary, etc.) of _____, the party making the foregoing Bid, that such Bid is genuine and not collusive or shame; that said Bidder has not colluded, conspired, connived, or agreed, directly or indirectly, with any Bidder or person, to put in a sham Bid, or that such other person shall refrain from bidding, and has not in any manner, directly or indirectly sought by agreement or collusion, or communications or conference, with any person, to fix the Bid Price, or of that of any other Bidder, or to secure any advantage against Owner any person interested in the proposed Contract; and that all statements in said Bid Proposal or Bid are true; and further, that such Bidder has not, directly or indirectly submitted this Bid, or the contents thereof, or divulged information or date relative thereto to any association or to any member or agent thereof.

_____(Bidder)

Sworn to and subscribed before me this [____] day of _____, 20___.

_____

Notary Public – State of _____ (NOTARY SEAL)

_____

(Name typed, printed or stamped)

My Commission Expires: _____

E-VERIFY COMPLIANCE CERTIFICATION

In accordance with Executive Order Number 11-116 from the office of the Governor of the State of Florida, Bidder hereby certifies that the U.S. Department of Homeland Security's E-Verify system will be used to verify the employment eligibility of all new employees hired by the contractor during the contract term, and shall expressly require any subcontractors performing work or providing services pursuant to the contract to likewise utilize the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of all new employees hired by the subcontractor during the contract term; and shall provide documentation of such verification to the OWNER upon request.

As the person authorized to sign this statement, I certify that this company complies/will comply fully with the above requirements.

DATE: _____ SIGNATURE: _____

COMPANY: _____ NAME: _____
(Typed or Printed)

ADDRESS: _____ TITLE: _____

_____

_____

E-MAIL: _____

PHONE NO.: _____

NORTHWEST FLORIDA BEACHES INTERNATIONAL AIRPORT
PANAMA CITY – BAY COUNTY AIRPORT AND INDUSTRIAL DISTRICT
CONSTRUCTION CONTRACT

Contractor: **(TBD)**
Address: **(TBD)**
Contact: **(TBD)**
Telephone: **(TBD)**
Facsimile: **(TBD)**

Contact Title: **Baggage Expansion Project**
Work Location: **Northwest Florida Beaches International Airport**
Owner: **Panama City – Bay County Airport and Industrial District**
Address: **6300 West Bay Parkway**
Panama City Beach, FL 32409
Telephone: **(850) 763-6751**

This construction contract (hereinafter the "Contract") is effective as of the **[ ]** day of **[ ], 20[ ]** between Owner and the above named Contractor who hereby agree that all Work specified below shall be performed by the Contractor in accordance with all provisions of this Contract, consisting of the following Project Documents:

1. Contract Form of Agreement, along with all addenda issued prior to execution of this Contract and modifications issued after execution of this Contract, including but not limited to duly issued Change Notices/Orders (as such term is defined in the General Conditions) and Amendments.
2. Exhibit "A" – Bid Proposal dated _____, General Conditions, Special Conditions
3. Exhibit "B" – Scope of Work
4. Exhibit "C" – Drawings and Technical Specifications

Contractor shall commence the Work within ten (10) calendar days after the Notice to Proceed is issued by the Owner, which shall be issued within ninety (30) calendar days (or such longer period of time the Owner and Contractor may mutually agree to in writing) of the execution of this Contract, Owner shall issue a Notice to Proceed to Contractor.

The Owner's issuance of the Notice to Proceed is expressly conditioned upon the satisfaction of the following condition precedents:

1. The Performance Bond has been delivered and is acceptable to the Owner,
2. The Payment Bond has been delivered and is acceptable to the Owner,
3. The Insurance Certificate has been delivered and is acceptable to the Owner,
4. A Project Schedule for the Work has been delivered and is acceptable to the Owner, and
5. A Schedule of Values for the Work has been delivered and is acceptable to the Owner.

DRAFT

Owner shall determine, in its sole discretion, whether these condition precedents have been satisfied, shall be final and binding on the Contractor. Should Owner determine that all such condition precedents have not been satisfied (or otherwise waived in writing by Owner, in its sole discretion), then Owner may send Contractor written notice that Owner has elected to terminate this Contract, in which event this Contract shall automatically be terminated and neither party shall have any further liability or obligation hereunder whatsoever to the other party. In the event of any such termination prior to issuance of the Notice to Proceed, Contractor acknowledges and agrees that it shall not be entitled to and Owner shall not be liable for any payments to Contractor arising out of or relating to this Contract.

Work to Be Performed: Except as specified elsewhere in the contract, Contractor shall furnish all plant; labor; materials; tools; supplies; equipment; transportation; supervision; safety; technical; professional; and other services; and shall perform all operations necessary and required to satisfactorily accomplish the Work all strictly in accordance with all requirements of the Bid and Project Documents.

Security: If awarded a Contract, undersigned may be required to obtain security clearance and SIDA badges for all workers on site.

Schedule: The Work shall be completed in accordance with the construction duration identified in the Notice to Proceed.

Compensation: As full consideration for the satisfactory performance by Contractor of this Contract, Owner shall pay to Contractor compensation in accordance with the prices set forth in the "Bid Proposal" included in Exhibit 'A' and the payment provisions of the Project Documents.

Payment Procedures

The successful Bidder shall be required as a pre-requisite of the Notice to Proceed to provide the Owner a "Schedule of Values", a statement allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing "Contractor's Application for Payment". Only a Contractor's Application for Payment that corresponds directly with the "Schedule of Values" approved by the Owner or its representative will be acceptable for payment consideration.

The Contractor shall submit three (3) signed and notarized original copies of each Application of Payment (AIA Document G702 and G703) on a monthly basis for Work completed and/or stored to date along with waivers of lien, schedule updates, and other pertinent information. The Owner's Representative will review the Application for Payment, evaluate the status of the Work, and recommend the amount to be authorized for payment less 5% retained by the Owner until the project is complete.

The amount authorized for payment will be made to the Contractor by the Owner in accordance with Florida Statutes §218.735. Retained amounts shall be released to the Contractor in accordance with Florida Statutes §218.735 following final acceptance of the Work by the Owner or its representative.

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Insurance: The Contactor shall procure and maintain the following described insurance, except for coverage(s) specifically waived by Owner, on policies and with insurers acceptable to Owner. These insurance requirements shall not limit the liability of Contractor.

The insurance coverage(s) and limits required of Contractor under this Contract are designed to meet the minimum requirements of Owner and the Owner does not represent these types or amounts of insurance to be sufficient or adequate to protect the Contractor's interests or liabilities. Contractor alone shall be responsible to the sufficiency of its own insurance program.

The Contractor and the Contractor's subcontractors and sub-subcontractors shall be solely responsible for all of their property, including but not limited to any materials, temporary facilities, equipment and vehicles, and for obtaining adequate and appropriate insurance covering any damage or loss to such property. The Contractor and the Contractor's subcontractors and sub-subcontractors shall expressly waive any claim against the Owner arising out of or relating to any damage or loss of such property, even if such damage or loss is due to the fault or neglect of the Owner or anyone for whom the Owner is responsible. The Contractor is obligated to include, or cause to be included, provisions similar to this paragraph in all of the Contractor's subcontracts and its subcontractor's contracts with their sub-subcontractors.

The Contractor's deductibles/self insurance retention's must be disclosed to Owner and are subject to Owner's approval. The Contractor is responsible of the amount of any deductible or self-insured retention. Any deductible or retention applicable to any claim or loss shall be the responsibility of Contractor and shall not be greater than $25,000, unless otherwise agreed to, in writing, by Owner.

Insurance required of the Contractor or any other insurance of the Contractor shall be considered primary, and insurance of Owner shall be considered excess, as may be applicable to claims or losses which arise out of or relate to the Work or this Project.

A. Workers' Compensation and Employers' Liability Insurance Coverage: The Contractor shall purchase and maintain workers' compensation and employers' liability insurance for all employees engaged in the Work, in accordance with the laws of the State of Florida. Limits of coverage shall not be less than:

$500,000	Limit Each Accident
$500,000	Limit Disease Aggregate
$250,000	Limit Disease Each Employee

B. Commercial General Liability Coverage: Contractor shall purchase and maintain commercial general liability insurance on a full occurrence form. Coverage shall include, but not be limited to, Premises and Operations, Personal Injury, Contractual for this Contract, Independent Contractors, Broad Form Property Damage, Products and Completed Operation Liability Coverage(s) and shall not

exclude coverage for the "X" (Explosion), "C" (Collapse) and "U" (Underground) Property Damage Liability exposures. Limits of coverage shall not be less than:

$1,000,000	Combined Single Limit Each Occurrence
$2,000,000	Aggregate Limit

Contractor shall add Owner as an additional insured through the use of Insurance Service Office Endorsements No. CG 20.20.22.85 wording or equivalent, or broader, an executed copy of which shall be attached to or incorporated by reference on the Certificate of Insurance to be provided by Contractor pursuant to the requirements of the Project Documents.

C. Business Automobile Liability Coverage: The Contractor shall purchase and maintain Business Automobile Liability Insurance as to ownership, maintenance, use, loading and unloading of all of Contractor's owned, non-owned, leased, rented or hired vehicles with limits not less than:

$1,000,000	Combined Single Limit Each Accident

D. Excess or Umbrella Liability Coverage: Contractor shall purchase and maintain Excess Umbrella Liability Insurance or Excess Liability Insurance on a full occurrence form providing the same continuous coverage(s) as required for the underlying Commercial General, Business Automobile and Employers' Liability Coverage(s) with no gaps in continuity of coverage(s) or limits with Owner added by endorsement to the policy as an additional insured in the same manner as is required under the primary policies, and shall not be less than:

$4,000,000	Each Occurrence/Accident

This Contract embodies the entire agreement between Owner and Contractor and supersedes all other writings. The parties shall not be bound by or be liable for any statement, representation, promise, inducement, or understanding not set forth herein.

OWNER	**CONTRACTOR**
Panama City – Bay County Airport and Industrial District	**(TBD)**
By:	**By:**
Authorized Signature: _____	**Authorized Signature: _____**
Print Name: _____	**Print Name: _____**

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ATTACHMENT 1

BOND NO. _____

PUBLIC PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: That _____ as Principal, and _____, as Surety, located at _____ (Business Address) are held and firmly bound to _____, as Obligee in the sum of ($_____) for the payment whereof we bind ourselves, our heirs, executors, personal representatives, successors and assigns, jointly and severally.

WHEREAS, Principal has entered into a contract dated as of the _____day of _____, 20__, with Obligee for _____, which contract is incorporated by reference and made a part hereof, and is referred to herein as the Contract.

THE CONDITION OF THIS BOND is that if Principal:

1. Promptly makes payment to all claimants as defined in Section 255.05(1), Florida Statutes, supplying Principal with labor, services, materials or supplies, used directly or indirectly by Principal in the prosecution of the Work provided for in the Contract, then this bond is void; otherwise it remains in full force; and

2. Any changes in or under the Contract and compliance or noncompliance with any formalities connected with the Contract or the changes do not affect Surety's obligation under this Bond. The Surety and the Principal further agree that any modifications, additions or alterations which may be made in the terms of the Contract or in the work to be done thereunder, or any extensions of the Contract, or other forbearance on the part of either Obligee or the Principal to the other, shall not in any way release the Principal and the Surety or either of them, their heirs, assigns, executors, administrators and successors, from their liability hereunder, notice to Surety of any such modifications, additions, extensions or forbearance being hereby expressly waived; and

3. Any action instituted by a claimant under this Payment Bond for payment must be in accordance with the notice and time limitation provisions in Section 255.05(2), Florida Statutes; and

4. The penal sum of this Payment Bond is in addition to the penal sum of the Performance Bond being executed concurrently herewith.

IN WITNESS WHEREOF, the above parties have executed this instrument this _____day of _____, 20__, the name of each party being affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Signed, sealed and delivered

PRINCIPAL:

_____

_____

_____
Witnessed as to Principal

By: _____
Name: _____
Its: _____

STATE OF _____
COUNTY OF_____

This foregoing instrument was acknowledged before me this ____day of _____, 20__, by _____,as _____ of _____, a _____corporation, on behalf of the corporation. He/she is personally known to me OR has produced _____as identification.

My Commission Expires:

_____
Notary Public (Signature)

(AFFIX NOTARY SEAL)

_____
(Printed Name)

_____
(Title or Rank)

_____
(Serial Number, if any)

ATTEST:

_____

_____
(Witnessed as to Surety)

_____

_____
Witnesses

SURETY:

_____
(Printed Name)

_____
_____
_____
(Business Address)

(Authorized Signature)

(Printed Name)

OR

_____
As Attorney in Fact
(Attach Power of Attorney)

_____
As Attorney in Fact
(Attach Power of Attorney)

_____
_____
_____
(Business Address)

_____
(Printed Name)

_____
(Telephone Number)

STATE OF _____
COUNTY OF_____

This foregoing instrument was acknowledged before me this ____day of _____, 20__, by _____,as _____ of _____, a _____corporation, on behalf of the corporation. He/she is personally known to me OR has produced _____as identification.

My Commission Expires:

_____
Notary Public (Signature)

(AFFIX NOTARY SEAL)

_____
(Printed Name)

_____
(Title or Rank)

_____
(Serial Number, if any)

ATTACHMENT 2

BOND NO. _____

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That _____ as Principal, and _____, as Surety, located at _____(Business Address) are held and firmly bound to _____, as Obligee in the sum of ($_____) for the payment whereof we bind ourselves, our heirs, executors, personal representatives, successors and assigns, jointly and severally.

WHEREAS, Principal has entered into a contract dated as of the _____day of _____, 20__, with Obligee for _____, which contract is incorporated by reference and made a part hereof, and is referred to herein as the Contract.

THE CONDITION OF THIS BOND is that if Principal:

1. Performs the Contract at the times and in the manner prescribed in the Contract; and
2. Pays Obligee any and all losses, damages, expenses, costs and attorneys' fees, including appellate proceedings, that Obligee sustains because of any default by Principal under the Contract, including, but not limited to, all delay damages, whether liquidated or actual, incurred by Obligee; and
3. Performs the guarantee of all work and materials furnished under this Contract for the time specified in the Contract, then this bond is void; otherwise it remains in full force.

Any changes in or under the Contract and compliance or noncompliance with any formalities connected with the Contract or the changes do not affect Surety's obligation under this Bond.

The Surety further agrees that whenever the Principal shall be, and is declared by Obligee to be, in default under the Contract and said default shall be construed to be any breach of any of the provisions of the Contract on the part of the Principal, as directed by Obligee, the Surety shall promptly remedy the default and will complete the Contract in accordance with its terms and conditions and shall fully indemnify and hold harmless Obligee form all costs, damages, and expenses which may arise thereafter (including reasonable attorneys' fees) and which the Obligee may suffer by reason of Surety's failure to so do.

The Surety and the Principal further agree that any modifications, additions, or alternations which may be made in the terms of the Contract or in the work to be performed thereunder, or any extensions of the Contract, or other forbearance on the part of either Obligee or the Principal to the other, shall not in any way release the Principal and the Surety, or either of them, their heirs, assigns, executors, administrators and successors, from their liability hereunder, notice to the Surety of any such modifications, additions, extensions or forbearance being hereby expressly waived.

The penal sum of this Performance Bond is in addition to the penal sum of the Payment Bond being executed concurrently herewith.

This instrument shall be construed in all respects as a common law bond. It is expressly understood that the time provisions and statute of limitations under Section 255.05, Florida Statutes, shall not apply to this bond.

IN WITNESS WHEREOF, the above parties have executed this instrument this _____day of _____, 20__, the name of each party being affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Signed, sealed and delivered

_____

_____
Witnessed as to Principal

PRINCIPAL:

_____

By: _____
Name: _____
Its: _____

STATE OF _____
COUNTY OF_____

This foregoing instrument was acknowledged before me this ____day of _____, 20__, by _____,as _____ of _____, a _____corporation, on behalf of the corporation. He/she is personally known to me OR has produced _____as identification.

My Commission Expires:

_____
Notary Public (Signature)

(AFFIX NOTARY SEAL)

_____
(Printed Name)

_____
(Title or Rank)

_____
(Serial Number, if any)

ATTEST:

SURETY:

_____
(Printed Name)

_____
_____
_____
(Business Address)

_____
(Authorized Signature)

_____
(Witnessed as to Surety)

_____
(Printed Name)

OR

_____

_____
Witnesses

_____
As Attorney in Fact
(Attach Power of Attorney)

_____
As Attorney in Fact
(Attach Power of Attorney)

_____
_____
_____
(Business Address)

_____
(Printed Name)

_____
(Telephone Number)

STATE OF _____
COUNTY OF_____

This foregoing instrument was acknowledged before me this ____day of _____, 20__, by _____,as _____ of _____, a _____corporation, on behalf of the corporation. He/she is personally known to me OR has produced _____as identification.

My Commission Expires:

_____
Notary Public (Signature)

(AFFIX NOTARY SEAL)

_____
(Printed Name)

_____
(Title or Rank)

_____
(Serial Number, if any)

CERTIFICATE OF ATTORNEY – OWNER

I, the undersigned,

_____

the duly authorized and acting legal representative of

PANAMA CITY-BAY COUNTY AIRPORT AND INDUSTRIAL DISTRICT

do hereby certify that I have examined the foregoing contract and the Surety Bond attached thereto and the manner of execution thereof, and that I am of the opinion that each of the aforesaid agreements has been executed by the proper representatives, and that said representatives have respectively the full power and authority to execute said agreements on behalf of the respective parties named therein, and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with the terms, conditions and provisions thereof.

Signed: _____

Title: _____

Date: _____

RELEASE OF LIENS

STATE OF: _____

COUNTY OF: _____

Before me, the undersigned Notary Public in and for the said County and State personally appeared _____, representing the Contractor _____, who being duly sworn according to law deposes and says that all labor, materials, and outstanding claims and indebtedness of whatever nature arising out of the performance of the Contract with _____ _____ (Owner) for _____ (Contract No.) have been paid in full and that for the final payment in the amount of $_____ _____, the Contractor releases and discharges the Owner and his authorized representatives from any liens or claims or any nature because of or arising from this Contract and/or its performance, which it has had, has or may have in the future.

By: _____

Sworn to and subscribed before me this ___ day of _____, 20____.

_____
Notary Public – State of _____ (NOTARY SEAL)

_____
(Name typed, printed or stamped)

My Commission Expires: _____

ADVERTISEMENT OF COMPLETION

_____(Contractor)

_____(Address)

gives notice of completion of_____(Project)

and sets _____ as the date of final settlement.

All persons and firms should file all claims for payment to the below address prior to the settlement date:

Northwest Florida Beaches International Airport
Panama City – Bay County Airport and Industrial District (Owner)
6300 West Bay Parkway
Panama City Beach, FL 32409

By: _____(Name)

_____(Title)

Leg:_____(Publication Dates)

NORTHWEST FLORIDA BEACHES INTERNATIONAL AIRPORT

GENERAL CONDITIONS

GC-1 Independent Contractor

Contractor represents that it is fully experienced, properly qualified, registered, licensed, equipped, organized, and financed to perform the Work under this contract. Contractor shall act as an independent contractor and is not an agent of the Owner in performing this contract, maintaining complete control over its employees and all its suppliers and subcontractors of any tier. Nothing contained in this contract or any lower-tier purchase orders or subcontracts awarded by the Contractor shall create any contractual relationship with the Owner and/or its representative. Contractor shall perform the Work hereunder in accordance with its own methods subject to compliance with the Contract.

GC-2 Authorized Representatives

Before starting the Work, Contractor shall designate in writing an authorized representative acceptable to the Owner or its representative to represent and act for Contractor and shall specify any and all limitations of such representative's authority.

GC-3 Notices

Any notices required hereunder shall be in writing and may be served either personally on the authorized representative of the receiving party at the Jobsite, by facsimile, by courier or express delivery, or by certified mail to the facsimile number or address of that party, or at such facsimile number or address as may have been directed by written notice.

GC-4 Contract Interpretations

All questions concerning interpretation or clarification of this Contract or applicable standards and codes, including the discovery of conflicts, discrepancies, errors or omissions, or the acceptable performance thereof by contractor, shall be immediately submitted in writing to the Owner or its representative for resolution. At all times Contractor shall proceed with the Work in accordance with the determinations, instructions, and clarifications of the Owner or its representative. Contractor shall be solely responsible for requesting instructions, interpretations or clarifications and shall be solely liable for any costs and expense arising from its failure to do so.

GC-5 Order of Precedence

All Project Documents and subsequently issued Change Orders and Amendments are essential parts of this Contract and a requirement occurring in one is binding as though occurring in all. In resolving conflicts, discrepancies, errors or omissions the following order of precedence shall be used

1. Instructions to Bidders
2. Special Conditions
3. General Conditions
4. Scope of Work
5. Specifications

GC-6 Standards and Codes

Wherever references are made in this contract to standards or codes in accordance with which the Work under this Contract is to be performed, the edition or revision of the standards or codes current on the effective date of this contract shall apply unless otherwise expressly stated. In case of conflict between any referenced standards and codes and any Project Documents, the Project Documents shall govern.

GC-7 Laws and Regulations

All applicable laws, ordinances, statutes, rules, regulations, orders or decrees, including Owner's Airport Security Program and other formally adopted rules and regulations, in effect at the time the Work under this Contract is performed shall apply to Contractor and its employees, representative, its subcontractors, sub-subcontractors, material suppliers and others under Contractor's Contract for the Work.

GC-8 Permits

Except as otherwise specified, Contractor shall procure and pay for all permits, licenses, certifications and other applicable governing authority requirements and inspections, other than inspection performed by the Owner or its representative and shall furnish any documentation, bonds, security, or deposits required to permit performance of the Work. Owner shall submit drawings and specifications to Bay County Builder Services on January 5, 2015 to initiate review and expedite review process. Contractor, upon award, shall immediately follow up, submit, secure, procure and pay for required permits with agencies.

GC-9 Taxes

Contractor shall pay all taxes, levies, duties and assessments of every nature due in connection with the Work under this Contract and shall make any and all payroll deductions and withholdings required by law, an hereby indemnifies and holds harmless the Owner and its representative from any liability on account of any and all such taxes, levies, duties, assessments, and deductions.

GC-10 Labor, Personnel and Work Rules

Contractor shall employ only competent and skilled personnel to perform the Work and shall remove from the Jobsite any Contractor personnel determined to be unfit or to be acting in violation of any provision of this Contract. Contractor is responsible for maintaining labor relations in such manner that there is harmony among workers and shall comply with and enforce Project and Jobsite procedures, regulations, work rules, and work hours established by the Owner or its representative.

The Owner may, at its sole discretion, directly or through its representative deny access to the Jobsite to any individual by written notice to Contractor and Contractor shall promptly replace such individual with another who is fully competent and skilled to perform the Work.

Contractor shall, to the extent permissible under applicable law, comply with the provisions of all labor agreement(s) which apply to the Work performed under this Contract. Unless other methods are established by Owner, the rules, regulations, and procedures of the Plan for Settlement of Jurisdictional Disputes in the Construction Industry, or any successor agreement thereto, shall be used to determine work assignments and to resolve jurisdictional disputes on work covered by this Contract.

GC-11 Commercial Activities

Neither Contractor nor its employees shall establish any commercial activity or issue concessions or permits of any kind to third parties for establishing commercial activities on the Jobsite or any other lands owned or controlled by Owner.

GC-12 Publicity and Advertising

Contractor shall not make any announcement, take any photographs, or release any information concerning this Contract, or Project, or any part thereof to any member of the public, press, business entity, or any official body unless prior written consent is obtained from the Owner.

GC-13 Safety and Health

Contractor shall be solely responsible for conducting operations under this Contract to avoid risk of harm to the health and safety of persons and property and for inspecting and monitoring all its equipment, materials and work practices to ensure compliance with its obligations under this contract. Contractor shall assume all responsibility and liability with respect to all matters regarding safety and health of its employees and the employees of Contractor's suppliers and subcontractors of any tier, with respect to the risks under this Contract.

GC-14 Environmental Requirements

Throughout performance of the Work, Contractor shall conduct all operations in such a way as to minimize impact upon the natural environment and prevent any spread or release of contaminated or hazardous substances and comply with all applicable laws, regulations, ordinances, statutes, rules, and codes governing environmental requirements and conduct the Work based on the requirements of this Contract including compliance with permit requirements and Project plans and approvals. Contractor shall indemnify Owner for any penalties, fines, and costs incurred, including costs for environmental studies and remediation, that arise due to Contractor's improper performance of the Work or Contractor's negligence.

GC-15 Site Conditions and Natural Resources

Contractor shall have the sole responsibility for satisfying itself concerning the nature and location of the Work and the general and local conditions, including but not limited to, transportation, access, disposal, handling/storage materials, labor availability, water, electrical power, road conditions, climatic conditions, soil conditions, seasons, hydrology, physical site condition, project area, topography, ground surface conditions, equipment and facilities needed preliminary to and during the performance of the Work. The failure of Contractor to acquaint itself with any applicable conditions will not relieve Contractor of the responsibility for properly estimating the difficulties, time or cost of successfully performing Contractor's obligations under this Contract.

GC-16 Differing Site Conditions

Where the Owner or its representative has made investigations of subsurface, surface and soil conditions in areas where work is to be performed under this Contract, such investigations are made by Owner or its representative for the purpose of study and design. If such records of such investigations are included in the Project Documents, the interpretation of such records shall be the sole responsibility of Contractor and the Owner or its representative assumes any responsibility whatsoever in respect to the sufficiency or accuracy of such investigations, the records thereof, or the interpretations set forth and there is no warranty or guarantee, either express or implied, that the conditions indicated by such investigations or records thereof are representative of those existing throughout such areas, or any part thereof, or that unforeseen developments may not occur, or that materials other than or in proportions different from those indicated may not be encountered.

GC-17 Contractor's Work Area

Contractor shall confine its operations to the areas designated in the plans as the areas of Work or access to the Work or areas designated for storage. Contractor shall coordinate with Owner any planned disruption of operations at, or adjacent to, Worksite. Contractor shall, at all times, keep its work areas in neat, clean and safe conditions. Upon completion of any portion of the Work, Contractor shall promptly remove from the work area all its equipment, storage, temporary structures, surplus materials not to be used at or near the same location during later stages of the Work. Upon completion of the Work and prior to final payment, Contractor shall at its expense satisfactorily dispose of all rubbish, remove all plant, equipment, and materials and leave the premises in a neat, clean and safe condition. If Contractor fails to comply with these foregoing requirements, Owner may accomplish same at Contractor's expense.

GC-18 Cooperation with Others

The Owner may have its employees, representatives, other contractors and other subcontractors working at the Jobsite during the performance of this Contract and Contractor's work or use of certain facilities may be interfered with as a result of such concurrent activities. Owner reserves the right to require Contractor to schedule the order of performance of the Work in such a manner as will minimize the interference with work of any of the parties involved.

GC-19 Responsibility for Work, Security and Property

Contractor shall be responsible for and shall bear any and all risk of loss or damage to work in progress and, pursuant to the Special Condition titled "Title and Risk of Loss," to equipment and materials. Contractor shall be responsible for all receiving and unloading of materials for the Work, storing of materials and equipment subject to degradation by the elements and secure same from other damage or loss. Contractor shall at all times conduct all operations under this Contract in a manner to avoid the risk of loss, theft, or damage by vandalism, sabotage or any other means to any equipment, materials, work or other property at the Jobsite. Contractor shall plan and conduct its operations so as not to enter into lands in their natural state unless pre-authorized by the Owner, damage, close, obstruct or otherwise interfere with any utility installation, ditch, highway, road, structure or other property, and if necessary to do so, receive the Owner's pre-permission prior to such obstruction or interference.

GC-20 Cleaning Up

Contractor shall, at all times, keep its work areas in a neat, clean and safe condition. Upon completion of any portion of the Work, Contractor shall promptly remove from the work area all its equipment, construction plant, temporary structures and surplus materials not to be used at or near the same location during later stages of the Work.

Upon completion of the Work and prior to final payment, Contractor shall at its expense satisfactorily dispose of all rubbish, remove all plant, buildings, equipment and materials belonging to Contractor and return to Owner's warehouse or Jobsite storage area all salvageable Owner supplied materials. Contractor shall leave the premises in a neat, clean and safe condition.

In event of Contractor's failure to comply with the foregoing requirements, Owner may accomplish same at Contractor's expense.

GC-21 Contractor's Plant, Equipment and Facilities

Contractor shall provide and use for the Work only such construction plant and equipment as are capable of producing the quality and quantity of work and materials required by this contract and within the time or times specified in the Contract Documents.

Before proceeding with the Work, Contractor shall furnish Owner's Representative and Owner with information and drawings relative to such equipment, plant and facilities as Owner's Representative or Owner may request. Upon written order of Owner or Owner's Representative, Contractor shall discontinue operation of unsatisfactory plant, equipment or facilities and shall either modify the unsatisfactory items or remove such items from the Jobsite.

GC-22 Use of Completed Portions of Work

Whenever, as determined by Owner, any portion of the Work performed by Contractor is suitable for use, Owner may, upon written notice, occupy and use such portion. Use shall not constitute acceptance, relieve Contractor of its responsibilities, or act as a waiver by Owner of any terms of this contract.

Contractor shall not be liable for normal wear and tear or for repair of damage caused by any misuse during such occupancy or use by Owner. If such use increases the cost or time of performance of remaining portions of the Work, Contractor shall, pursuant to the General Condition titled "Changes," be entitled to an equitable adjustment in its compensation or schedule under this contract.

If, as a result of Contractor's failure to comply with the provisions of this contract, such use proves to be unsatisfactory to Owner, Owner shall have the right to continue such use until such portion of the Work can, without injury to Owner, be taken out of service for correction of defects, errors, omissions or replacement of unsatisfactory materials or equipment as necessary for such portion of the Work to comply with the contract; provided that the period of such operation or use pending completion of appropriate remedial action shall not exceed twelve (12) months unless otherwise mutually agreed in writing between the parties.

Contractor shall not use any permanently installed equipment until such use is approved in writing by Owner. When such use is approved, Contractor shall, at Contractor's expense properly use and maintain and, upon completion of such use, recondition such equipment as required to meet specifications.

If Owner's Representative or Owner furnishes an operator for such permanently installed equipment, all services performed shall be under the complete direction and control of Contractor, and such operator shall be considered Contractor's employee for all purposes other than payment of such operator's wages, Worker's Compensation Insurance or other benefits.

GC-23 Inspection, Quality Surveillance, Rejection of Materials and Workmanship

All material and equipment furnished and work performed shall be properly inspected by Contractor at its expense, and shall at all times be subject to quality surveillance and quality audit by Owner's Representative, Owner or their authorized representatives who, upon reasonable notice, shall be afforded full and free access to the shops, factories or other places of business of Contractor and its suppliers and subcontractors of any tier for such quality surveillance or audit. Contractor shall provide safe and adequate facilities, drawings, documents and samples as requested, and shall provide assistance and cooperation including stoppage of work to perform such examination as may be necessary to determine compliance with the requirements of this contract. Any work covered prior to any quality surveillance or test by Owner's Representative or Owner shall be uncovered and replaced at the expense of contractor if such covering interferes with or obstructs such inspection or test. Failure of Owner's Representative or Owner to make such quality surveillance or to discover defective design, equipment, materials or workmanship shall not relieve Contractor of its obligations under this contract nor prejudice the rights of Owner thereafter to reject or require the correction of defective work in accordance with the provisions of this contract.

If any work is determined by Owner's Representative or Owner to be defective or not in conformance with this contract the provisions of the General Condition titled "Warranty" shall apply.

GC-24 Testing

Unless otherwise provided in the Contract, testing of soils, equipment, materials or work shall be performed by Contractor at its expense and in accordance with the Project Documents. Should tests in addition to those required by this Contract be desired by the Owner or its representative, Contractor will be given reasonable notice by the Owner or its representative for such testing and at the Owner's expense.

GC-25 Expediting

The equipment and materials furnished and work performed under this contract shall be subject to expediting by Owner's Representative and/or Owner or their representative who shall be afforded full and free access to the shops, factories, and other places of business of Contractor and its suppliers and subcontractors of any tier for expediting purposes. As required by Owner's Representative or Owner, Contractor shall provide detailed schedules and progress reports for use in expediting and shall cooperate with Owner's Representative and/or Owner in expediting activities.

GC-26 Excusable Delays

If Contractor's performance of this Contract is prevented or delayed by any unforeseeable cause, existing or future, which is beyond the reasonable control of the parties and without the fault or negligence of Contractor, Contractor shall, within twenty-four (24) hours of the commencement of any such delay, give the Owner or its representative written notice thereof and within seven (7) calendar days of commencement of the delay, a written description of the anticipated impact of the delay on performance of the Work. Delays attributable to within the control of Contractor's suppliers or subcontractors of any tier shall be deemed delays within the control of Contractor. Contractor expressly acknowledges and agrees that it shall receive no damages for delay and Contractor's so remedy, if any, against Owner will be the right to seek an extension of time.

GC-27 Changes

Owner may at any time, without notice to the sureties if any, by written Change Order unilaterally make any change in the Work within the general scope of this Contract, including but not limited to changes in the method, manner

and sequence of Contractor work, in Owner furnished facilities, equipment, materials services or site(s) and directing acceleration or deceleration in performance of the Work and modifying the Contract Schedule or the Contract Milestones.

If the Owner and Contractor are unable to agree on a Change Order for the requested change, Contractor shall, nevertheless, promptly perform the change as directed by the Owner in a written Construction Change Directive. In that event, the Contract Price and Contract Time shall be adjusted in the Construction Change Directive as determined by the Owner. If Contractor disagrees with the Owner's adjustment determination, Contractor must make a claim strictly in accordance with the terms of this General Condition or else be deemed to have waived any claim it might otherwise have had on that matter.

In addition, in the event of an emergency which Owner determines endangers life or property, Owner may use oral orders to Contractor for any work required by reason of such emergency. Contractor shall commence and complete such emergency work as director by the Owner or its representative and such orders will be confirmed by written Change Order.

If at any time Contractor believes that acts or omissions of Owner or its representative constitute a change to the Work not covered by a Change Order or requirements of the Project Documents, Contractor shall within seven (7) calendar days of discovery of such act or omission submit a written Change Order Request explaining in detail the basis for the request. The Owner will either issue a Change Order or deny the request in writing.

If Contractor intends to assert a claim for an equitable adjustment under this clause it must, within ten (10) calendar days after receipt of a Change Order or denial of same provide written notification of such intent and within a further twenty (20) calendar days, submit to Owner or its representative a written proposal setting forth the nature, schedule, impact and monetary extent of such claim in sufficient detail to permit thorough analysis and negotiations.

Change Order Requests from the Contractor shall be presented to the Owner in sufficient detail to allow for evaluation. Minimum information shall include Contractor, Sub-contractor and Sub-sub-contractor itemization of Labor, Materials and Equipment costs included in the Change Order. Labor shall include labor-hours and hourly rates. Hourly rates will be the direct hourly rate of the personnel performing the work plus an allowable labor burden. The labor burden shall either be an audited labor burden or 0.5%, if an audited rate is not available. Material and Equipment shall be included at their direct costs, which shall be supported by itemized invoices for billing. If equipment is rented thru a related company, the rental rate shall be no greater than the average rental rate for similar equipment in Bay County. Related company shall mean a company owned or controlled by any owner or officer of the Contractor and Subcontractor.

Subcontractor's and Sub-sub-contractor's allowable mark-up for overhead and profit on Labor, Material and Equipment in the Change Order shall be individually no greater than 10% and in aggregate no greater than 15%.

Contractor's allowable mark-up for overhead and profit on Labor, Material and Equipment in the Change Order shall be 10%.

Additional General Conditions shall not be included in a Change Order unless the Change Order changes effects the critical path and changes the Time of Completion. Any change order request affecting the critical path shall include a detailed schedule show the change effect on the critical path.

Any delay by Contractor in giving notice or presenting a proposal for adjustment under this clause shall be grounds for rejection and waiver of the claim and in no case shall a claim by Contractor be considered if asserted after final payment under this Contract.

Contractor shall proceed diligently with performance of the Work, pending final resolution of any request for relief, dispute, claim, appeal, or action arising under the Contract, and comply with any direction from the Owner or its representative.

Escalation/De-escalation
In the event of a significant price increase of material occurring during the performance of the contract through no fault of the Contractor, the Contract Sum shall be equitably adjusted by Change Order in accordance with the procedures of the Contract Documents as well as those set forth herein. A change in price of an item of material will be considered significant when the price of an item increases or decreases by 20% percent between the date of this Contract and the date of installation.

In order to receive an escalation change order, Contractor shall share with the Owner, in writing, prior to the time of execution of this Agreement, its estimated costs for the relevant materials that it believes may be subject to potential escalation (the "Escalation List"). The Escalation List shall be made an exhibit to this Agreement. Prior to purchasing any of the listed materials, the Contractor must provide the Owner with three (3) timely and credible proposals from suppliers as well as a third-party price index such as RS Means, Steel Market Update or the like to confirm the credibility of the proposals. If the pricing escalation cannot be overcome through value engineering, substitutions or early purchasing/warehousing, the parties may enter into a change order in the amount of the lowest proposal or price index amount. These change orders shall not include overhead or profit mark-ups on the increases from either the Contractor or its Subcontractors. Failure to include a material in the initial Escalation List shall be considered a waiver of the right to seek escalation for such materials without the Owner's consent which may be withheld in the Owner's sole discretion.

In addition, if prices decrease from what was in the Contractor's original estimate, the Owner shall be entitled to a deduct if there is a significant decrease in the price.

GC-28 Disputes
Contractor shall not be entitled to claim and neither Owner nor its representative shall be liable to Contractor or its suppliers or subcontractors of any tier in tort (including negligence), or contract except as specifically provided in this Contract. Any claim arising out of or attributable to the interpretation or performance of this Contract which cannot be resolved by negotiation shall be considered a dispute within the meaning of this clause. If for any reason Owner and Contractor are unable to resolve a claim for an adjustment, Contractor shall notify Owner or its representative in writing that a dispute exists and request a final determination by Owner. Owner shall, within thirty (30) calendar days of its receipt of any written request by Contractor, provide a written final determination setting for the contractual basis for its decision and defining what contract adjustments it considers equitable. Upon Contractor's written acceptance of Owner's determination, the Contract will be modified and the determination implemented accordingly or, failing agreement, the dispute resolution procedures as set forth in the Special Conditions titled "Dispute Resolution" shall be complied with.

GC-29 Records and Audit
The Contractor shall maintain an acceptable cost accounting system. The Contractor agrees to provide the Sponsor, the Federal Aviation Administration and the Comptroller General of the United States or any of their duly authorized representatives' access to any books, documents, papers, and records of the contractor which are directly pertinent to the specific contract for the purpose of making audit, examination, excerpts and transcriptions. The Contractor agrees to maintain all books, records and reports required under this contract for a period of not less than three years after final payment is made and all pending matters are closed.

Contractor shall maintain records and accounts in connection with the performance of this Contract which will accurately document incurred costs, both direct and indirect, of whatever nature for a period of three (3) years from the Final Acceptance of the Work unless a longer period of time is otherwise specified by applicable law. Owner or its representative shall have the right to examine and copy, at all reasonable times and with advance notification, such records and accounts for the purpose of verifying payments or requests for payment when costs are the basis of such payment and to evaluate the reasonableness of proposed contract price adjustments and claims.

GC-30 Warranty
Contractor warrants to Owner that materials furnished under this contract shall be of clear title and of the most suitable grade of their respective kinds for their intended uses, unless otherwise specified and shall also conform to

the requirements of this Contract. All workmanship shall be first class and performed in accordance with sound construction practices acceptable to Owner or its representative.

If at any time prior to Final Acceptance or after Final Acceptance in cases of latent defects, fraud or such gross mistakes as amount to fraud, Owner, Owner's Representative, or Contractor discover any defect in the equipment, materials, workmanship, or Contractor-provided design, immediate written notice shall be given to the other parties. Contractor shall within a reasonable time propose corrective actions to cure such defects.

Owner may at its sole discretion, or through Owner's Representative, direct Contractor in writing and Contractor agrees to:

1. Rework, repair, or remove and replace defective equipment and materials or re-perform defective workmanship to acceptable quality at a time and in a manner acceptable to Owner;
2. Cooperate with others assigned by Owner to correct such defects and pay to Owner all actual costs reasonably incurred by Owner in performing or in having performed corrective actions; or
3. Propose and negotiate in good faith an equitable reduction in the Contract price in lieu of corrective action.

The warranty described by this General Condition is in addition to any more specific warranty required by the Invitation to Bid, the Scope of Work, the Specifications, or provided by the Contractor as part of its bid or as a separate document.

GC-31 Backcharges

Owner may, in addition to any other amounts to be retained as defined in the Contract, retain from any sums otherwise owing to Contractor amounts sufficient to cover the full costs of any Contractor failure to comply with provisions of this Contract or Contractor acts or omissions in the performance of any part of this Contract, including but not limited to, violation of any applicable law, order, rule, or regulation, including those regarding safety, hazardous materials or environmental requirements; correction of defective or nonconforming work by repair, rework, replacement or other appropriate means when Contractor states, or by its actions indicates, that it is unable or unwilling to proceed with corrective action in a reasonable time; and/or the Owner is required to take action or perform work for Contractor, such as cleanup, off-loading or completion of incomplete work.

Owner may also backcharge against Contractor for work done or cost incurred to remedy these or any other Contractor defaults, errors, omissions or failures to perform or observe any part of this Contract. Owner may, but shall not be required to, give Contractor written notice before performing such actions or work or incurring such cost. Cost of backcharge work shall include labor costs including payroll additives, incurred net delivered material costs, incurred lower-tier supplier and subcontractor costs directly related to performing the corrective action, equipment and tool rentals are prevailing rates in the Jobsite area and a factor, determined by the Owner, but not greater than sixty percent (60%), shall be applied to the total of these items for Owner's overhead, supervision, administrative and other related costs.

Owner shall separately invoice or deduct and retain from payments otherwise due to Contractor the cost as provided herein. Owner's right to backcharge is in addition to any and all other rights and remedies provided in this Contract or by law. The performance of backcharge work by Owner shall not relieve Contractor of any of its responsibilities under this Contract including but not limited to express or implied warranties, specified standards for quality, contractual liabilities an indemnifications, and meeting the milestones of the Special Condition titled "Commencement, Progress and Completion of the Work."

GC-32 Indemnity

To the maximum extent permitted by Florida law, Contractor shall indemnify and hold harmless Owner and its officers and employees and its representatives from any and all liabilities, claims, damages, penalties, demands, judgments, actions, proceedings, losses or costs, including, but not limited to, reasonable attorneys' fees and paralegals' fees, whether resulting from (1) any claimed breach of this Contract by Contractor or (2) from personal

injury, property damage, direct or consequential damages, or economic loss, to the extent caused by the negligence, recklessness, or intentional wrongful misconduct of Contractor or anyone employed or utilized by the Contractor in the performance of this Contract.

GC-33 Consequential Damages

Except as expressly provided below in the second paragraph of this Section GC-33, Contractor and Owner shall waive all claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes damages incurred by Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work. This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with the requirements herein.

Notwithstanding anything in this Section GC-33 or any other term of the Project Documents to the contrary, it is acknowledged and agreed by Contractor that expressly excluded from the above referenced waiver of consequential damages provisions are any consequential damages arising out of or relating to this Contract suffered by Owner for which Contractor otherwise would be liable as provided in the following three (3) sentences. Consequential damages are not waived by Owner to the extent such consequential damages would be covered and paid for by any applicable insurance. Further, with respect to such consequential damages incurred by Owner that are not paid by any applicable insurance, Owner does not waive and Contractor shall be liable to Owner for such consequential damages up to the total cumulative amount of those reasonable amounts expected by Contractor as profit. Further still, with respect to any consequential damages incurred by Owner that are due to the gross negligence or intentional wrongful acts or omissions of Contractor or anyone for whom Contractor is responsible, Owner does not waive and Contractor shall be liable to Owner for all such consequential damages. Nothing herein shall be construed as a cap or limitation on any liquidated damages Contractor may owe Owner pursuant to the terms of the Project Documents.

GC-34 Assignments and Subcontracts

Any assignment of this Contract or rights hereunder, in whole or part, without the prior written consent of Owner shall be void, except that upon ten (10) calendars days written notice to Owner or its representative, Contractor may assign monies due or to become due under this Contract, provided that any assignment of monies shall be subject to proper set-offs in favor of Owner and any deductions provided for in this Contract. Purchase orders and subcontracts of any tier must include provisions to secure all rights and remedies of Owner provided under this Contract and must impose upon the lower-tier supplier and subcontractor all of the duties and obligations required to fulfill this Contract. No assignment or subcontract shall relieve Contractor or its sureties of the responsibilities under this Contract.

GC-35 Suspension

Owner or its representative may by written notice to Contractor suspend at any time the performance of all or any portion of the Work to be performed under the Contract. After receipt of such notice, Contractor shall immediately discontinue work on the date and to the extent specified in the notice, place no further orders or subcontracts for material, services, or facilities with respect to the suspended work other than to the extent required in the notice, continue to protect and maintain the Work including those portions on which work has been suspended, and take any other reasonable steps to minimize cost associated with such suspension.

Upon receipt of notice to resume suspended work, Contractor shall immediately resume performance under this Contract to the extent required in the notice.

GC-36 Termination for Default

Notwithstanding any other provisions of this contract, Contractor shall be considered in default of its contractual obligations under this Contract if it performs work which fails to conform to the requirements of this Contract; fails to make progress so as to endanger performance of this contract within the required time periods; abandons or refuses to proceed with any of the Work, including modifications or changes directed pursuant to the General

Conditions titled "Changes;" fails to fulfill or comply with any of the terms of this Contract' engages in behavior that is dishonest, fraudulent or constitutes a conflict of interest with Contractor's obligations under this Contract; or Contractor becomes insolvent or makes a general assignment for the benefit of creditors or reasonable grounds for insecurity arise with respect to Contractor's performance.

Upon the occurrence of any of the foregoing, Owner shall notify Contractor in writing of the nature of the failure and of Owner's intention to terminate the Contract for default. If Contractor does not cure such failure within seven (7) calendar days from receipt of notification, or sooner if safety is involved, or fails to provide satisfactory evidence that such default will be corrected within a reasonable time, Owner may, by written notice to Contractor, and without notice to Contractor's sureties, if any, terminate in whole or in part Contractor's right to proceed with the Work and Owner may prosecute the Work to completion by contract or by any other method deemed expedient. Owner may take possession of and utilize any data, designs, licenses, equipment, materials, plant, tools, and property to any kind furnished by Contractor and necessary to complete the Work.

Contractor and its sureties, if any, shall be liable for all costs in excess of the Contract price for such terminated work incurred by Owner in the completion of the Work, including cost of administration of any purchase order or subcontract awarded to others for completion.

Upon termination for default, Contractor shall immediately discontinue work on the date and to the extent specified in the notice and place no further purchase orders or subcontracts to the extent that they relate to the performance of the terminated work; inventory, maintain and turn over to Owner all data, designs, licenses, equipment, materials, plant, tools, and property furnished by Contractor or provided by Owner for performance of the terminated work; promptly obtain cancellation upon terms satisfactory to Owner of all purchase orders, subcontracts, rentals, or any other agreements existing for performance of the terminated work or assign those agreements as director by Owner or its representative; cooperate with Owner or its representative in the transfer of data, designs, licenses, and information and disposition of work in progress so as to mitigate damages; comply with other reasonable requests from Owner or its representative regarding the terminated work; and continue to perform in accordance with all of the terms and conditions of this Contract such portion of the Work that is not terminated.

If, after termination pursuant to this clause, it is determined for any reason that Contractor was not in default, the rights and obligations of the parties shall be the same as if the notice of termination had been issued pursuant to the General Condition entitle Optional Termination.

GC-37 Optional Termination

Owner may, at its option, terminate for convenience any of the Work under this Contract in whole or, from time to time, in part, at any time by written notice to Contractor. Such notice shall specify the extent to which the performance of the Work is terminated and the effective date of such termination.

Upon receipt of such notice Contractor shall immediately discontinue the Work on the date and to the extent specified in the notice and place no further purchase orders or subcontracts for materials, services, or facilities, other than as may be required for completion of such portion of the Work that is not terminated; promptly obtain assignment or cancellation upon terms satisfactory to Owner of all purchase orders, subcontracts, rentals, or any other agreements existing for the performance of the terminated work or assign those agreements as directed by Owner or its representative; assist Owner or its representative in the maintenance, protection and disposition of work in progress, plant, tools, equipment, property and materials acquired by Contractor or furnished by Owner or its representative under this Contract; and complete performance of such portion of the Work which is not terminated.

Upon any such termination, Contractor shall waive any claims for damages including loss of anticipated profits; on account thereof, but as the sole right and remedy of Contractor, Owner shall pay in accordance with (1) the Contract price corresponding to the work performed in accordance with this Contract prior to such notice of termination; (2) all reasonable costs for work thereafter performed as specified in such notice; (3) reasonable administrative costs of settling and paying claims arising out of the termination of work under purchase orders or subcontracts; (4)

reasonable increased costs incurred in demobilization and the disposition of residual material, plant, and equipment; and (5) reasonable overhead and profit on items 2 through 4.

Contactor shall submit with thirty (30) calendar days after receipt of notice of termination, a written statement setting forth its proposal for an adjustment to the Contract price to include only the incurred costs described in this clause. Owner and its representative shall review, analyze, and verify such proposal, and negotiate an equitable adjustment, and the Contract shall be modified accordingly.

GC-38 Final Inspection and Acceptance

When Contractor considers the Work, or any Owner identified independent portion of the Work under this Contract to be complete and ready for acceptance, Contractor shall notify Owner or its representative in writing. Owner and its representative, with Contractor's cooperation, will conduct such reviews, inspections and tests as may be reasonably required to satisfy the Owner and its representative that the Work, or identified portion of the Work, conforms to all requirements of the Contract. If all or any part of the Work covered by Contractor's notice does not conform to contract requirements, Owner or its representative shall notify Contractor of such nonconformance and Contractor shall take corrective action and then have the nonconforming work re-inspected until all contract requirements are satisfied.

Owner's written Certification of Final Acceptance of the Work under this Contract shall be final and conclusive except with regard to latent defects, fraud or such gross mistake as amount to fraud, or with regard to Owner's rights under the General Conditions titled "Warranty".

GC-39 Non-Waiver

Failure by Owner to insist upon strict performance of any terms or conditions of this contract, or failure or delay to exercise any rights or remedies herein or by law, or failure to properly notify Contractor in the event of breach, or the acceptance of or payment for any goods or services, hereunder, or the review or failure to review designs shall not release Contractor from any of the warranties or obligations of this Contract and shall not be deemed a waiver of any right of Owner to insist upon strict performance hereof or any of its rights or remedies as to any prior or subsequent default hereunder nor shall any termination of work under this contract by Owner operate as a waiver of any of the terms hereof.

GC-40 Government Restricted Parties and Commodities

Contractor acknowledges that all applicable export rules and regulations of the origin countries shall apply to the exports of commodities, software and technology (technical data and assistance) under this contract. Contractor also acknowledges that other rules and regulations may restrict the use of certain parties under this contract. Such rules and regulations are generally described below.

1. Restricted Parties Lists

   Country governments and international organizations such as the United Nations and European Union publish Restricted Parties List ("Lists") that identify parties (such as known or suspected terrorists, money launderers and drug traffickers) restricted from certain or all types of transactions. Contractor shall review all applicable Lists prior to initiating transactions with any third party for the performance of all or any portion of the Work to ensure such third party is not identified on any applicable Lists. Contractor shall not enter into any transactions with any third party identified on any applicable Lists.

2. Licensing Requirements

   (a) General: Each country has export regulations that control commodities, software and technology for various reasons, such as national security, foreign policy, anti-terrorism, and to avoid the proliferation of weapons and potential weapons, e.g. certain nuclear, chemical or biological agents. Numerous countries have export regulations that specifically address dual-use items, meaning commercial items with the potential to be applied to military and/or weapon proliferation uses. Contractor shall ensure

that all necessary export licenses are obtained, or license exceptions confirmed, prior to the export of any commodity, software, or technology.

(b) United States of America (USA) Export Licensing Requirements: Contractor is solely responsible for obtaining any required USA export licenses for all commodities, software, and technology being supplied in the performance of the Work, except for any commodity, software or technology supplied by Owner. A copy of the export license, or rationale as to why a license is not required, shall be provided to Owner's Representative or Owner upon request.

Contractor shall be responsible for any delay resulting from Contractor's failure to comply fully and timely with any such rule or regulation described above.

Contractor hereby agrees to indemnify, defend and hold Owner's Representative, Owner, each of their respective affiliates and the respective directors, officers, employees and representatives of each harmless from and against any and all claims, legal or regulatory actions, final judgments, reasonable attorneys' fees, civil fines and any other losses which any of them may incur as a result of Contractor's failure to comply with its obligations under this clause.

GC-41 Equal Employment Opportunity

Contractor is aware of and is fully informed of Contractor's obligation under Executive Order 11246 and, where applicable, shall comply with the requirements of such Order and all orders, rules, and regulations promulgated thereunder unless exempted therefrom.

Without limitation of the foregoing, Contractor's attention is directed to 41 Code of Federal Regulations (CFR), Section 60-1.4, and the clause titled "Equal Opportunity Clause" which, by this reference, is incorporated herein.

Contractor is aware of and is fully informed of Contractor's responsibilities under Executive Order No. 11701 "List of Job Openings for Veterans" and, where applicable, shall comply with the requirements of such Order and all orders, rules and regulations promulgated thereunder unless exempted therefrom.

Without limitation of the foregoing, Contractor's attention is directed to 41 CFR section 60-250 et seq. and the clause therein titled "Affirmative Action Obligations of Contractors and Subcontractors for Disabled Veterans and Veterans of the Vietnam Era," which by this reference, is incorporated herein.

Contractor certifies that segregated facilities, including but not limited to washrooms, work areas and locker rooms, are not and will not be maintained or provided for Contractor's employees. Where applicable, Contractor shall obtain a similar certification from any of its subcontractors, vendors, or suppliers performing the Work under this contract.

Contractor is aware of and is fully informed of Contractor's responsibilities under the Rehabilitation Act of 1973 and the Americans with Disabilities Act and, where applicable, shall comply with the provisions of each Act and the regulations promulgated thereunder unless exempted therefrom.

Without limitation of the foregoing, Contractor's attention is directed to 41 CFR Section 60-741 and the clause therein titled "Affirmative Action Obligations of Contractors and Subcontractors for Handicapped Workers," which by this reference, is incorporated herein.

GC-42 Disadvantaged Business Enterprises Program

Contractor shall support Owner's policy and commitment to maximizing, where practical, business opportunities for Disadvantaged Business Enterprises (as identified in the Special Conditions item SC-21) by actively identifying, encouraging and assisting in their participation and otherwise making a good faith effort to achieve the DBA goals established for this project.

GC-43 Authority of Owner's Representative

The Owner's Representative 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 Owner's Representative also shall decide all questions that may arise as to the interpretation of the specifications or plans relating to the Work. The Owner's Representative shall determine the amount and quality of the several kinds of Work performed and materials furnished which are to be paid for under the contract.

GC-44 Conformity with Plans and Specifications

All Work and all materials furnished shall be in conformity with the dimensions, quality, quantity, material, and testing requirements that are specified (including specified tolerances) in the Contract Documents.

If the Owner's Representative finds the materials furnished, Work performed, match or the finished product not within conformity with the Contract Documents but that the portion of the Work affected will, in its opinion, result in a finished project having a level of safety, economy, durability, and workmanship acceptable to the Owner, it will advise the Owner of its recommendation that the affected Work be accepted and remain in place. In this event, the Owner's Representative will document its 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 Owner's Representative determination and recommended contract price adjustments will be based on the Owner's Representative's reasonable judgment and such test or retests of the affected Work as are, in its opinion, needed. Owner may accept or reject the Owner's Representative's recommendation (including any price adjustment recommendation) in its sole discretion. Changes in the contract price shall be covered by Change Order or supplemental agreement, as applicable.

If the Owner's Representative finds the materials furnished, Work performed, or the finished product are not in conformity with the Contract Documents and which Owner has not decided to accept with a price adjustment as provided above, the affected Work or materials shall be removed and replace or otherwise corrected by and at the expense of Contractor in accordance with the Owner's Representative's written orders.

For the purpose of this subsection, nothing herein shall be construed as waiving Contractor's responsibility to complete the Work in accordance with the Invitation to Bid or Bid Specifications.

Neither Owner's Representative nor Owner will be responsible for the Contractor's means, methods, techniques, sequences, or procedures of construction or the safety precautions incident thereto.

GC-45 Authority and Duties of Inspectors

Inspectors employed by the Owner or Owner's Representative shall be authorized to inspect all Work done and all materials furnished. Such inspection may extend to all or any part of the Work and to the preparation, fabrication, or manufacture of the materials 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 employed by the Owner or Owner's Representative are authorized to notify the Contractor or its 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 Owner's Representative for its initial decision.

GC-46 Source of Supply and Quality Requirements

The materials used in the Work shall conform to the requirements of the Contract Documents. 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, Contractor shall furnish complete statements to the Owner's Representative 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 Owner's Representative'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.

GC-47 Samples, Tests, and Cited Specifications

Except for those tests to be performed by Contractor pursuant to the Contract Documents, all materials used in the Work may be inspected, tested, and approved or denied by the Owner's Representative at any time before incorporation in the Work, its decision. Any Work in which untested materials are used at the Contractors risk. Any untested materials used in the Work and are found to not comply with requirements of the Contract Documents, such materials shall be removed and replaced with materials tested and approved by the Owner's Representative at the Contractor's expense. Materials found to be unacceptable will not be paid for.

Unless otherwise designated in the Contract Documents, tests in accordance with the cited standard methods of ASTM, AASHTO, Federal Specifications, Commercial Item Descriptions, and all other cited methods, which are current on the date of advertisement of the bids, will be made by the Owner's Representative or Owner at the Owner's expense. The testing organizations performing on site 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 its request. Unless otherwise designated, samples will be taken by a qualified representative of the Owner's Representative. All materials being used are subject to inspection, test, or rejection at any time prior to or after incorporation into the Work. Copies of all tests will be furnished to the Contractor's representative at its request.

The Contractor shall employ a testing organization to perform all Contractor required tests. The Contractor shall submit to the Owner's Representative resumes on all testing organizations and individual persons who will be performing the tests. The Owner's Representative shall have the right, following review of such credentials, to reject any organization or individual persons performing the tests at its decision and require the Contractor to find alternative organizations or individuals acceptable to the Owner's Representative. All the test data shall be reported to the Owner's Representative after the results are known. Legible, printed reports of all test data shall be given to the Owner's Representative within five (5) business days of such tests. After completion of the Work, and prior to final payment, Contractor shall submit a final report to the Owner's Representative showing all test data reports, plus an analysis of all results showing ranges, averages, and corrective action taken on all failing tests.

GC-48 Certification of Compliance

The Owner's Representative 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 Owner's Representative.

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 deliver to the Work. Such certificates 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 Work.

Should the Contractor propose to furnish an "or equal" material or assembly, it shall furnish the manufacturer's certificates of compliance as hereinbefore described for the specified brand name material or assembly prior to and

be approved by the Owner's Representative prior to its order and delivery to the Work. Any material or assembly furnished "or equal" not prior approved shall be removed from the Work at the Contractor's cost and shall not be paid for.

GC-49 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 Documents 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 Owner's Representative or Owner at or on an Owner approved site,
b. The Contractor has furnished the Owner's Representative with acceptable evidence of the quantity and quality of such stored or stockpiled materials,
c. The Contractor has furnished the Owner's Representative 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 its responsibility for furnishing and placing such materials in accordance with the requirements of the Contract Documents.

In no case will the amount of partial payments for materials on hand exceed the allocated portion of the contract price for such materials or the contract price for the contract item in which the material is intended to be used, less any applicable retained portions. The Contractor shall bear all costs associated with the partial payment of stored or stockpiled materials in accordance with the provisions of this subsection.

GC-50 Bid Security

Guarantee will be required with each bid as a certified check on a solvent bank or a bid bond in the amount of five (5) percent of the total amount of the bid, made payable to the Panama City–Bay County Airport and Industrial District.

GC-51 Bonding Requirements

The successful bidder will be required to furnish separate performance and payment bonds each in an amount equal to 100% of the contract price.

GC-52 Performance and Payment Securities

The successful Bidder shall deliver to the Owner or the Owner's Authorized Representative no later than ten (10) calendar days after contract award and prior to commencing the Work or entering the Project Site, a Performance and Payment Bond in the form supplied in the bid and project documents and executed, as surety, by a corporation acceptable to the Owner and authorized to issue such bonds in the jurisdiction of Bay County, Florida. Such Performance Bond and Payment Bond shall each be for one hundred percent (100%) of the total as set forth in Bidder's proposal. The cost of such Performance Bond and Payment Bond shall be included in the Guaranteed Maximum Price submitted in the Bidder's Proposal

END OF GENERAL CONDITION

NORTHWEST FLORIDA BEACHES INTERNATIONAL AIRPORT

SPECIAL CONDITIONS

SC-1 Definitions

Whenever the following terms are used, the intent and meaning shall be interpreted as follows:

AIR OPERATIONS AREA (AOA) means any area of the airport used or intended to be used for the landing, takeoff, or surface maneuvering of aircraft including paved and unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiways and/or aprons.

AIRPORT TICKET OFFICE (ATO) means any area of the airport terminal used or intended to be used for the ticketing and baggage check for passengers. This area includes staff work and break areas.

CALENDAR DAY means every day shown on the calendar.

CHANGE ORDER means a written order to the Contactor signed by Owner and its representative covering changes in the plans, specifications, or proposed quantities and establishing a basis of payment and contract time adjustment, if any, for the work affected by such changes.

CONTRACT DOCUMENTS mean all the written and drawn documents comprising the Contract for the Project.

CONTACT SCHEDULE means the Work execution schedule developed by Contactor and approved by Owner for implementation of the Work.

CONTRACTOR means the individual, partnership, Limited Liability Company or corporation, its authorized representatives, successors, and permitted assigns as identified in the Contract.

FAA means the Federal Aviation Administration of the U.S. Dept. of Transportation.

INSPECTOR means authorized representative of Owner assigned to make all necessary inspections and/or tests of the work performed or being performed, or the materials furnished or being furnished by Contractor.

JOBSITE means the designated site for the Project where the Work will be performed by the Contractor.

NOTICE TO PROCEED (NTP) means a written notice to Contractor to begin the actual work for the designated portion thereof by a specified date and date on which the Contract begins.

OWNER means Panama City–Bay County Airport and Industrial District dba Northwest Florida Beaches International Airport.

OWNER'S REPRESENTATIVE means the designated agent of the Owner to administer this Contract for the Owner, which shall be the Owner, unless a change is provided by written notice from Owner to Contractor.

PROJECT means the scope of work (Work) under this **Baggage Expansion** at Northwest Florida Beaches International Airport (ECP), Panama City Beach, Florida.

SPECIFICATIONS mean a part of the Invitation to Bid containing the written directions and requirements for completing the Contract Work.

WORK means all the stated or implied activities to be performed by Contractor as required by the Project Documents.

SC-2 Insurance

The Contactor shall procure and maintain the following described insurance, except for coverage(s) specifically waived by Owner, on policies and with insurers acceptable to Owner. These insurance requirements shall not limit the liability of Contractor.

The insurance coverage(s) and limits required of Contractor under this Invitation to Bid are designed to meet the minimum requirements of Owner and the Owner does not represent these types or amounts of insurance to be sufficient or adequate to protect the Contractor's interests or liabilities. Contractor alone shall be responsible to the sufficiency of its own insurance program.

The Contractor and the Contractor's subcontractors and sub-subcontractors shall be solely responsible for all of their property, including but not limited to any materials, temporary facilities, equipment and vehicles, and for obtaining adequate and appropriate insurance covering any damage or loss to such property. The Contractor and the Contractor's subcontractors and sub-subcontractors shall expressly waive any claim against the Owner arising out of or relating to any damage or loss of such property, even if such damage or loss is due to the fault or neglect of the Owner or anyone for whom the Owner is responsible. The Contractor is obligated to include, or cause to be included, provisions similar to this paragraph in all of the Contractor's subcontracts and its subcontractor's contracts with their sub-subcontractors.

The Contractor's deductibles/self-insurance retention's must be disclosed to Owner and are subject to Owner's approval. The Contractor is responsible of the amount of any deductible or self-insured retention. Any deductible or retention applicable to any claim or loss shall be the responsibility of Contractor and shall not be greater than $25,000, unless otherwise agreed to, in writing, by Owner.

Insurance required of the Contractor or any other insurance of the Contractor shall be considered primary, and insurance of Owner shall be considered excess, as may be applicable to claims or losses which arise out of or relate to the Work or this Project.

A. Workers' Compensation and Employers' Liability Insurance Coverage: The Contractor shall purchase and maintain workers' compensation and employers' liability insurance for all employees engaged in the Work, in accordance with the laws of the State of Florida. Limits of coverage shall not be less than:

$500,000 Limit Each Accident
$500,000 Limit Disease Aggregate
$250,000 Limit Disease Each Employee

B. Commercial General Liability Coverage: Contractor shall purchase and maintain commercial general liability insurance on a full occurrence form. Coverage shall include, but not be limited to, Premises and Operations, Personal Injury, Contractual for this Contract, Independent Contractors, Broad Form Property Damage, Products and Completed Operation Liability Coverage(s) and shall not exclude coverage for the "X" (Explosion), "C" (Collapse) and "U" (Underground) Property Damage Liability exposures. Limits of coverage shall not be less than:

$1,000,000 Combined Single Limit Each Occurrence
$2,000,000 Aggregate Limit

Contractor shall add Owner as an additional insured through the use of Insurance Service Office Endorsements No. CG 20.20.22.85 wording or equivalent, or broader, an executed copy of which shall be attached to or incorporated by reference on the Certificate of Insurance to be provided by Contractor pursuant to the requirements of the Project Documents.

C. Business Automobile Liability Coverage: The Contractor shall purchase and maintain Business Automobile Liability Insurance as to ownership, maintenance, use, loading and unloading of all of Contractor's owned, non-owned, leased, rented or hired vehicles with limits not less than:

$1,000,000 Combined Single Limit Each Accident

D. Excess or Umbrella Liability Coverage: Contractor shall purchase and maintain Excess Umbrella Liability Insurance or Excess Liability Insurance on a full occurrence form providing the same continuous coverage(s) as required for the underlying Commercial General, Business Automobile and Employers' Liability Coverage(s) with no gaps in continuity of coverage(s) or limits with Owner added by endorsement to the policy as an additional insured in the same manner as is required under the primary policies, and shall not be less than:

$4,000,000 Each Occurrence/Accident

SC-3 Owner Furnished Drawings and Specifications

Owner's Representative will furnish specifications and/or design drawings of the Project for each part of the Work under this contract. Such drawings and specifications will give the information required for the preparation of shop detail drawings by Contractor.

Contractor shall, upon receipt thereof, check promptly all specifications and/or drawings furnished and shall notify Owner's Representative and Owner of any omissions or discrepancies in such specifications or drawings found.

All specifications and/or drawings for the Work are identified as the Passenger Boarding Bridges (PBB). Should any addenda be issued or other modifications to the specifications and/or drawings occur prior to NTP of the contract, Owner's Representative will prepare a consolidated and conformed set of specifications and/or drawings marked "Issued for Bid" and issued by Owner's Representative. Contractor shall perform the Work in accordance with the "Issued for Bid" specifications and/or drawings. Contractor shall immediately review the "Issued for Construction" specifications and/or drawings and promptly notify the Owner's Representative and Owner in writing if Contractor believes anything in the "Issued for Bid" specifications and/or drawings represents a material change from what was reflected in the bid documents, addenda, and changes/modifications thereafter accepted by the Contractor with the Contract and prior to the NTP and identify any effects on cost and schedule.

SC-4 Owner Furnished Utilities, Facilities, Materials and Equipment

Owner will not furnish to Contractor any utilities, facilities, materials and/or equipment. Owner shall designate in the Project Documents or in written form to Contractor's request for such designation the location where Contractor facilities for storage may be temporarily placed.

SC-5 Permits

Any required permits shall be provided by Contractor. Except as otherwise specified, Contractor shall procure and pay for all permits, licenses, certifications and other applicable governing authority requirements and inspections, other than inspection performed by the Owner or its representative and shall furnish any documentation, bonds, security, or deposits required to permit performance of the Work. Owner shall submit drawings and specifications to Bay County Builder Services to initiate review and expedite review process. Contractor, upon award, shall immediately follow up, submit, secure, procure and pay for required permits.

SC-6 Contractor Furnished Drawings, Data and Samples

Owner's Representative and Owner's permission to proceed with the Work does not constitute acceptance or approval of submittals including, but not limited to, design details, calculations, analyses, test methods, construction methods, certificates or materials developed or selected by Contractor and does not relieve

Contractor from full compliance with the Contract Documents. Drawings required of the Contractor if not specifically identified in the specifications shall include drawings for fabrication of Contractor furnished equipment or materials, installation of Contractor furnished equipment or materials, planning and performance of the Work under this contract, material samples, material certificates and other appropriate data.

DRAWINGS: All drawings required to be submitted by Contractor shall be certified by Contractor to be correct, shall show the contract number and shall be furnished in accordance with the contract drawings and data requirements and forms. The Owner's Representative or its representative shall review Contractor's drawings and a reproducible drawing marked with one of the following codes will be returned to Contractor:

a. Reviewed, No Comments,
b. Reviewed, Comments as Noted (Work May Proceed),
c. Rejected, Revise and Resubmit,
d. No Review Required.

All drawings submitted by Contractor shall be submitted to the Owner's Representative for review at least thirty (30) calendar days before fabrication, installation, or performance is commenced and at Contractor's expense.

SAMPLES: All samples required to be submitted by Contractor shall be certified by Contractor to be representative of materials to be incorporated in the Work, shall show the contract number and shall be furnished in accordance with the contract drawings and data requirements and forms. All samples submitted by Contractor shall be submitted to the Owner's Representative for review at least fifteen (15) calendar days before materials are incorporated into the Work and at Contractor's expense. The Owner's Representative or its representative shall review the sample and return the Contractor's submittal form marked as noted for drawings.

CERTIFICATES AND DATA: Where certificates are required, one (1) copy of each certificate and one (1) computer file of same shall be submitted by and at the expense of Contractor. Such submittal shall be made not less than thirty (30) calendar days prior to the time that the materials represented by such certificates are needed for incorporation into the Work. Certificates shall be subject to review and material represented by such certificates shall not be fabricated, delivered to the Jobsite or incorporated into the Work without such review.

Certificates shall clearly identify the material being certified and shall include, but not be limited to, providing the following information: Contractor's name, project name, contract number, name of item, manufacturer's name, and reference to the appropriate drawing, technical specification section and paragraph number, all as applicable.

AS-BUILT DRAWINGS AND SPECIFICATIONS: During construction, Contractor shall keep a current marked-up controlled set of as-built drawings on the Jobsite as an accurate record of all deviations between work as shown on the drawings and work as installed. These drawings shall be available to the Owner's Representative, Owner or their representatives for inspection at any time during regular business hours. Contractor shall at its expense and no later than thirty (30) calendar days after final acceptance and before final payment furnish to the Owner's Representative a complete set of signed marked-up as-built reproducible (bond paper) drawings with "As-Built" clearly printed on each sheet and a PDF electronic copy of same. Contractor will keep a current marked-up controlled set of as-built specifications on the Jobsite annotated to clearly indicate all substitutions that are incorporated into the Work. Where the selection of more than one product is specified, annotation shall show which product was installed.

SC-7 Commencement, Progress, Completion of the Work and Project Schedule

Contractor shall complete the Work under this Invitation to Bid within six (6) months of Notice to Proceed unless otherwise negotiated, and approved, by the Owner.

Contractor will provide, in a form acceptable to Owner and/or its representative, a project schedule in sufficient detail to clearly outline the Work to be performed under this Contract and milestone dates for major work events such as the start and completion of major components of the Project, as one of the prerequisites to issuance of the Notice to Proceed after the execution of the Contract. The Owner's Representative shall review the Project Schedule

and shall accept, accept with comment, or reject with comment. Contractor shall revise the schedule as required by the Owner's Representative and resubmit until accepted.

Contractor shall periodically update the Project Schedule as required and no less than weekly to support the pay-application to promptly reflect the progress of the Work. Should any of the work not be performed as indicated and be later than originally planned to perform, a recovery plan shall be presented to the Owner or its representative for approval.

SC-8 Temporary Access and Haul Roads

Access to Secured Areas will be granted in accordance with the Owner's TSA-approved Airport Security Program. Haul roads and routes will be identified during a scheduled pre-construction meeting with the Contractor.

SC-9 Safety, Health and Security Requirements

Contractor will comply with all applicable federal, state and local laws, ordinances, statutes, rules, regulations, orders or decrees, including the Airport Safety Program and other rules and regulations adopted by Owner, in effect at the time the Work under this Contract is performed shall apply to Contractor and its employees, representative, its subcontractors, sub-subcontractors, material suppliers and others under Contractor's Contract for the Work.

SC-10 Applicable Law

This contract shall be governed by and construed in accordance with the laws of State of Florida excluding its conflict of law rules which may apply the laws of any other jurisdiction, and each party hereto agrees not to assert as a defense in any proceeding that it is not subject to the laws of State of Florida.

SC-11 Invoicing and Payment

Contractor shall prepare and submit invoices monthly or at some other pre-approved interval with estimates submitted for review by Owner and its representative at least ten (10) calendar days prior to formal submittal period for review and field inspection to verify estimated payment amounts requested. Following review and Owner's and its representative's approvals, Contractor will submit invoice (form as specified in the Project Documents) for payment. Owner shall pay Contractor undisputed amounts submitted and approved, in accordance with the terms of the Project Documents, pursuant to Florida Statutes §218.735.

Contractor shall certify in each invoice that no known outstanding mechanic's or material-men liens and all due and payable bills have been paid or are included in the application for payment.

Each invoice shall be accompanied by a submission of information regarding Disadvantaged Business Enterprise (DBE) goals and accomplishments during the period covered by the payment application in a format acceptable to OWNER. CONTRACTOR'S payment application shall include the amounts authorized for payment to each DBE firm and its certification number. Failure to submit DBE-related information with the request for payment will result in the payment application being returned to the CONTRACTOR for correction.

Owner shall retain five percent (5%) of that portion of the gross amount of each payment request submitted to Owner for payment, until fifty percent (50%) completion of the Work. Owner reserves the right, at its sole discretion, to further release any potion of such retainage prior to final payment and prior to such release, require Contractor to submit for itself, its subcontractors of all tiers, and all material suppliers, vendors, laborers and other parties acting through or under it, complete waivers and releases of all claims against Owner or its representative arising under or by virtue of this Contract to the extent of payments made and Contractor, upon request by Owner or its representative, shall in addition furnish acceptable evidence that all such claims have been satisfied.

Any amounts otherwise payable under this Contract may be withheld, in whole or in part, to the extent reasonably necessary to protect Owner's interest, if any claims are filed against Owner for which Contractor is or may become liable, Contractor is in material default of any Contract condition including, but not limited to, the schedule, quality

assurance and health and safety requirements, Contractor has not submitted a Project Schedule or required updates or proper insurance certificates and continuous coverage(s) as required by the Project Documents and proof thereof of any required Performance and Payment Bonds, any adjustments that are due from previous overpayment or audit results, or offsets in favor of Owner in other transactions are asserted. Owner will pay such withheld payments if Contractor pays, satisfies, or discharges any claim of Owner against Contractor under or by virtue of this Contract or cures all defaults in the performance of this Contract.

Contractor agrees to pay each of its subcontractors under this contract for satisfactory performance of its subcontract pursuant to Florida Statutes §218.735, Florida's Prompt Payment Act.

Owner shall make final payment to Contractor in accordance with Florida Statutes §218.735, following Final Acceptance of the Work and after submittal of such final invoice, provided that Contractor shall have furnished Owner or its representative for itself, its subcontractors of all tiers, and all material suppliers, vendors, laborers and other parties acting through or under it, waivers and releases of all claims against Owner arising under or by virtue of this Contract, except such claims, if any, as may with the consent of Owner be specifically excepted by Contractor from the operation of the release in stated amounts to be set forth therein.

SC-12 Owner's Representative

Owner has designated a Representative to act for and on behalf of Owner for carrying out certain contract activities as expressly designated herein and may, by contract change order, modify its representative authority, replace the representative, or dispense with the representative's services without relieving Contractor of any of its obligations under this Contract. Contractor acknowledges and agrees that the Owner's Representative has no authority to authorize or approve changes to the Contract.

Owner, after consultation with the Owner's Representative, shall decide any and all questions which may arise as to the quality and acceptability of materials furnished, work performed, and as to the matter of performance and rate of progress of the Work. Owner, after consultation with the Owner's Representative shall decide all questions which may arise as to the interpretation of the specifications and drawings relating to the Work, the fulfillment of the contract on the part of Contractor, and the rights of different contractors on the Project. Owner, after consultation with the Owner's Representative shall determine the amount and quality of the several kinds of work performed and materials furnished which are to be paid for under this contract.

SC-13 Nondisclosure

Contractor agrees not to divulge to third parties, without the written consent of Owner, any information obtained from or through Owner or its representative in connection with the performance of this Contract unless the information is (1) known to Contractor prior to obtaining the same from Owner or its representative, (2) disclosed to Contractor in the public domain, or (3) obtained by Contractor from a third party who did not receive same, directly or indirectly from Owner or its representative and who has no obligation of secrecy with respect thereto.

SC-14 Dispute Resolution

In the event of a dispute between the parties arising out of or relating to their responsibilities under this Contract, the party claiming the dispute shall provide the other party promptly written notice of such dispute, as required by the terms of the Contract. The parties hereby agree that they shall first negotiate dispute to resolve the dispute in good faith in an attempt to prevent the need for mediation or litigation. Accordingly, within seven (7) calendar days of receipt of the initial written dispute notice, the parties shall commence discussions between the on-site project managers. In the event the parties are unable to reach a resolution of the dispute within seven (7) calendar days after such commencement of the discussions between the on-site managers, the parties shall commence discussions between Contractor's President and the Owner's Executive Director. In the event that such parties are unable to reach a resolution of the dispute within fourteen (14) calendar days after such commencement of the discussions between the President and Executive Director, the parties shall submit the dispute to non-binding mediation before a mutually agreed mediator who shall conduct such mediation proceedings. All costs of mediation shall be shared equally by the parties, except that each party shall be responsible for its own attorney's fees.

If the parties are unable to resolve the dispute through mediation and litigation proves necessary, either party may initiate such litigation. In the event of any such litigation, the prevailing party shall be entitled to recover its reasonable attorneys' fees and costs through all trial and appellate levels of such litigation. Any litigation between Owner and Contractor (which term for the purposes of this subparagraph shall include Contractor's surety), whether arising out of any claim or arising out of the Contract or any breach thereof, shall be brought, maintained and pursued only in the appropriate State of Florida Courts for Bay County, Florida, and Owner and Contractor each hereby waive and renounce any and all rights and options which they, or either of them, have or might have to bring or maintain any such litigation or action in the Federal Court system of the United States or in any United States Federal District Court. Owner and Contractor expressly waive all rights to trial by jury regarding any such litigation.

In the event of a dispute between the parties arising out of or relating to their responsibilities under this Contract, the party claiming the dispute shall provide the other party promptly written notice of such dispute, as required by the terms of the Contract. The parties hereby agree that they shall first negotiate dispute to resolve the dispute in good faith in an attempt to prevent the need for mediation or litigation. Accordingly, within seven (7) calendar days of receipt of the initial written dispute notice, the parties shall commence discussions between the on-site project managers. In the event the parties are unable to reach a resolution of the dispute within seven (7) calendar days after such commencement of the discussions between the on-site managers, the parties shall commence discussions between Contractor's President and the Owner's Executive Director. In the event that such parties are unable to reach a resolution of the dispute within fourteen (14) calendar days after such commencement of the discussions between the President and Executive Director, either party may initiate such litigation. In the event of any such litigation, the prevailing party shall be entitled to recover its reasonable attorneys' fees and costs through all trial and appellate levels of such litigation, including the fees and costs incurred to litigate the amount of attorney's fees and costs due under said action. Any litigation between Owner and Contractor (which term for the purposes of this subparagraph shall include Contractor's surety), whether arising out of any claim or arising out of the Contract or any breach thereof, shall be brought, maintained and pursued only in the appropriate State of Florida Courts for Bay County, Florida, and Owner and Contractor each hereby waive and renounce any and all rights and options which they, or either of them, have or might have to bring or maintain any such litigation or action in the Federal Court system of the United States or in any United States Federal District Court. Owner and Contractor expressly waive all rights to trial by jury regarding any such litigation.

A company that, at the time of bidding or submitting a proposal for a new contract or renewal of an existing contract, is on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, created pursuant to s. 215.473, or is engaged in business operations in Cuba or Syria, is ineligible for, and may not bid on, submit a proposal for, or enter into or renew a contract with an agency or local governmental entity for goods or services of $1 million or more.

SC-15 Liquidated Damages

In the event of Contractor's failure to meet the Project Schedule, the Contractor shall pay liquidated damages to the Owner in the amount of $760.00 per day. The parties agree to this arrangement due to the impracticability and difficulty in ascertaining the true value of the damages the Airport will incur as a result of such delay and said sum per day is agreed to be a reasonable estimate of the amount of such damages which the Airport will sustain. The parties further agree that such liquidated damages shall be deducted from any amounts owing to Contractor, and if such amounts owing are insufficient, the Contractor shall pay to Airport the amount of the difference.

SC-16 Drugs, Alcohol and Weapons

Contractor's personnel, subcontractor's personnel at any tier, material supplier's personnel or any other's personnel at any time shall not bring onto the Jobsite, or any other location where the provisions of this Contract apply any firearm of whatsoever nature or any other object which in the judgment of the Owner or its representative is determined to be a potential weapon, or alcoholic beverages of any nature, illegal or Owner prohibited non-prescription drugs of any nature without exception.

SC-17 Owner Directed Purchase (ODP)

Contractor agrees that Owner at its sole election **may** have Contractor assign some or all of its purchase orders and subcontracts directly to Owner in accordance with the provisions set forth herein.

Material suppliers shall be selected by Contractor using competitive bidding/proposals. Supply contracts shall be awarded by Contractor to the supplier whose bid/proposal is most advantageous to Owner, price and other factors considered. Contractor shall include the price of all materials in his bid and shall include all Florida State sales and other taxes normally applicable to such material and equipment. Owner may consider purchasing any item but does not expect to issue purchase orders to less than five thousand dollars ($5,000.00). Owner purchase of selected materials and equipment will be administered on a deductive Change Order basis.

Contractor shall provide Owner a list of all intended suppliers, vendors and material men for consideration as ODP. Contractor shall submit price quotes from the vendors, as well as a description of the materials to be supplied, estimated quantities and prices.

Upon request from Owner, and in a timely manner, Contractor shall prepare Purchasing Requisition Request Form which shall, in form and detail acceptable to Owner, specifically identify the materials which Owner may, in its discretion, elect to purchase directly. The Purchasing Requisition Request Form shall include:

a. the name, address, telephone number and contact person for the material supplier,
b. manufacturer or brand, model, or specification number of the item,
c. quantity needed as estimated by Contractor,
d. the price quoted by the supplier for the materials identified therein,
e. any sales tax associated with such quote,
f. delivery dates as established by Contractor,
g. any reduction in Contractor's cost for both the Payment Bond and Performance Bond,
h. shipping, handling and insurance costs,
i. detail concerning bonds or letters of credit provided by the supplier if included in his/her proposal,
j. special terms and conditions which have been negotiated with the supplier relative to payment terms, discounts, rebates, warranty, credits or other terms and conditions which revert to Owner.

Contractor shall include copies of vendors' quotations and specifically reference any terms and conditions, which have been negotiated with the vendors concerning letters of credit, terms, discounts, or special payments.

After receipt of the Purchasing Requisition Request Form, Owner shall prepare a Purchase Order for all items of material, which Owner chooses to purchase directly. The purchase order shall be sent to the vendor with a copy sent to Contractor. Pursuant to the Purchase Order, the vendor will provide the required quantities of material at the price established in the vendor's quote to Contractor, excluding any sales tax associated with such price. The Purchase Order shall also require the delivery of the ODP on the delivery dates provided by Contractor in the Purchasing Requisition Request Form.

In conjunction with the execution of the Purchase orders by the suppliers, Contractor shall execute and deliver to Owner one or more deductive Change Orders, referencing the full value of all ODP to be provided by each supplier from whom Owner elected to purchase material directly, plus all sales taxes associated with such materials in Contractor's bid to Owner, plus any savings to Contractor in the cost of Payment and Performance Bonds associated with such ODP. To compensate Contractor for the warranty enforcement obligation Contractor's overhead and profit associated with ODP shall not be deducted from the Contract.

Contractor shall be fully responsible for all matters relating to the procurement of materials furnished by and incorporated into the Project in accordance with these Supplementary Conditions including, but not limited to, assuring the correct quantities, placing the order in a timely manner, and assuring coordination of purchases, providing and obtaining all warranties and guarantees required by the Project Documents, inspection and acceptance of the goods at the time of delivery. Contractor shall coordinate delivery schedules, sequence of delivery, loading orientation, and other arrangements normally required by Contractor for the particular

materials furnished. Contractor shall provide all services required for the unloading, handling and storage of materials through installation.

Owner assumes the risk of loss of materials through their incorporation into the installation.

As ODP are delivered to the Jobsite, Contractor shall visually inspect all shipments form the suppliers, and sign off on the receiving reports for material delivered. Contractor shall assure that each delivery of ODP is accompanied by documentation adequate to identify the Purchase Order against which the purchase is made. This documentation may consist of a delivery ticket and an invoice from the supplier conforming to the Purchase Order together with such additional information as Owner may require. Contractor will then forward the receiving report to Owner to match up with invoice for payment.

Contractor shall insure that ODP conform to the Specifications and determine prior to incorporation into the Work if such materials are patently defective, and whether such materials are identical to the materials ordered and match the description on the bill of lading. If Contractor discovers defective or non-conformities in ODP upon such visual inspection, Contractor shall not utilize such nonconforming or defective materials in the Work and instead shall promptly notify Owner of the defective or nonconforming condition so that repair or replacement of those materials can occur without any undue delay or interruption to the Project. If Contractor fails to perform such inspection and otherwise incorporates into the work such defective or nonconforming ODP, the condition of which it either knew or should have known by performance of an inspection, Contractor shall be responsible for all damages to Owner resulting from Contractor's incorporation of such materials into the Project including liquidated or delay damages.

Contractor shall maintain records of all ODP it incorporates into the Work from the stock of ODP in its possession. Contractor shall account monthly to Owner for any ODP delivered into Contractor's possession, indicating portions of all such materials which have been incorporated into the Work.

Contractor shall be responsible for obtaining and managing all warranties and guarantees for all materials and products as required by the Project Documents. All repair, maintenance or damage-repair calls shall be forwarded to Contractor for resolution with the appropriate supplier, vendor, or subcontractor. Additionally, ODP items shall be warranted by Contractor as part of Contractor's warranty. Contractor agrees and understands that it shall undertake all warranty enforcement and other related duties of Owner for its ODP equipment and materials. To that end, Contractor expressly agrees it shall make no distinction in discharging such warranty duties between ODP equipment and materials and equipment and materials otherwise supplied by Contractor.

Notwithstanding the transfer of ODP by Owner to Contractor's possession, Owner shall retain legal and equitable title to any and all ODP.

The transfer of possession of ODP from Owner to Contractor shall constitute a bailment for the mutual benefit of Owner and Contractor. Owner shall be considered the bailor and Contractor the bailee of the ODP. ODP shall be considered returned to Owner for purposes of their bailment at such time as they are incorporated into the Project.

Owner shall purchase and maintain builder's risk insurance sufficient to protect against any loss of or damage to ODP. Such insurance shall cover the full value of any ODP not yet incorporated into the Project during the period between the time the Owner first takes title to any of such ODP and the time when the last of such is incorporated into the Project. Contractor shall purchase and maintain builder's risk, all risk, insurance based on the completed value of Project, less the Owner's ODP values. Contractor must name Owner as additional insured on its policy.

Owner shall in no way be liable for any interruption or delay in the Project, for any defects or other problems with the Project, or for any extra costs resulting from any delay in the delivery of, or defects in, ODP. Contractor's sole or exclusive remedy shall be an extension of the Contract Time for such reasonable time as determined by Owner or its representative.

Contractor shall be required to review invoices submitted by all suppliers of ODP delivered to the project site and either concur or object to Owner's issuance of payment to the suppliers, based upon Contractor's records of materials delivered to the site and any defects detected in such materials.

In order to arrange for the prompt payment to the supplier, prompt submittal of a copy of the applicable Purchase Order as receiving report, invoices, delivery tickets, written acceptance of the delivered items, and such other documentation as may be reasonably required by Owner. Upon receipt of the appropriate documentation, Owner shall prepare a check drawn to the supplier based upon the data provided. This check will be released and remitted directly to the supplier. Contractor agrees to assist Owner to immediately obtain partial or final release of waivers as appropriate.

At the end of the Project, Contractor will be provided with a deductive Change Order for the costs incurred by Owner to provide all ODP, not covered by previous change orders. Salvage materials shall be stored or removed from the site at Owner or its representative's direction or may be turned over to Contractor by Owner for salvage or disposal at Owner's option.

SC-18 Risk of Loss

Contractor shall be responsible for risk of loss or damage in progress and all goods furnished until Final Acceptance, including any losses resulting from inclement weather or erosion.

SC-19 Component Warranties

In addition to the General Condition title "WARRANTY," Contractor shall obtain and provide, for the benefit of owner and its successors in interest, warranties or guarantees for the equipment, materials, and work furnished by suppliers and subcontractors of any tier for the period customarily provided by the supplier. Contractor shall use its best efforts to enforce such lower-tier warranties or guarantees on its own behalf or, if requested by Owner or Owner's Representative, on behalf of Owner. Contractor shall provide warranty documentation by Final Acceptance or as otherwise required by this contract.

SC-20 Procedures to Minimize Risk to Stormwater System and Environment

Contractor acknowledges GC-14 Environmental Requirements and will have no significant impact on the stormwater system or environment while completing the Work.

SC-21 Miscellaneous Federal Provisions

The work performed under this Contract shall be governed by the following Federal provisions, statutes and regulations:

Disadvantaged Business Enterprise – 49 CFR Part 26: Contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of this DOT-assisted contract. In accordance with 49 CFR Part 26.45, the sponsor shall establish a contract goal of participation for small business concerns owned and controlled by certified socially and economically disadvantaged enterprise (DBE). Contractor shall make and document good faith efforts, as defined in Appendix A of 19 CFR Part 26, to meet his established goal.

Davis-Bacon Act, as amended – 29 CFR Part 5: Contractor is required to comply with wage and labor provisions and to pay minimum wages in accordance with the current schedule of wage rates established by the United States Department of Labor.

Debarment, Suspension, Ineligibility and Voluntary Exclusion – 49 CFT Part 29: Contractor certifies, by submission of a proposal or acceptance of a contract, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. Individuals or companies listed in the General Services Administration's "Excluded Parties Listing System" will not be considered for award of contract.

Certification Regarding Debarment and Suspension (Non-Procurement) – Title 2 CFR Part 180 & Title 2 CFR Part 1200: This Agreement is a "covered transaction" as defined by Title 2 CFR Part 180. Contractor has agreed that at the time it submitted its proposal and throughout the duration of this Agreement that neither it nor its principals are presently debarred or suspended by any Federal department or agency from participation in this transaction. Contractor further agrees to comply with Title 2 CFR Part 1200 and Title 2 CFR Part 180, Subpart C by administering each lower tier subcontract that exceeds $25,000 as a "covered transaction".

Certification Regarding Debarment and Suspension (Non-Procurement) – Title 2 CFR Part 1200 and Title 2 CFR Part 180, Subpart C: Contractor 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. Contractor shall accomplish this by:

i. Checking the System for Award Management at website: http://www.sam.gov
ii. Collecting a certification statement similar to paragraph a.
iii. Inserting a clause or condition in the covered transaction with the lower tier contract

If the FAA later determines that an individual failed to tell a higher tier that they were excluded or disqualified at the time they entered the covered transaction with that person, the FAA may pursue any available remedy, including suspension and debarment

Foreign Trade Restrictions – 49 CFR Part 30: Contractor and its subcontractors shall not be owned or controlled by one or more citizens of a foreign country included in the list of countries that discriminate against U.S. firms published by the Office of the United States Representative (USTR)' shall not knowingly entered into any contract or subcontract for this project with a person that is a citizen or national of a foreign country on said list, or is owned or controlled directly or indirectly by one or more citizens or nationals of a foreign country on said list; and shall not procure any product nor subcontract for the supply of any product for use on the project that is produced in a foreign country on said list.

Buy American Certificate – Aviation Safety and Capacity Act of 1990: This contract is subject to the "Buy American Preferences" of the Aviation Safety and Capacity Act of 1990.

SC-22 Certifications

Contractor shall execute, in the presence of a Notary Public (where required), and return the certifications noted below:

1. Bid Affidavit
2. Non-Collusion Affidavit
3. Sworn Statement under Section 287.133(3)(A), Florida Statutes, on Public Entity Crimes
4. DBE Certificate of Compliance Affidavit
5. Davis-Bacon Certification
6. Drug Free Workplace Certification
7. Certification of Non-Segregated Facilities
8. Buy American Certification
9. Trench Safety Act Certification

SC-23 Clean Air and Water Pollution Control

Contractors and subcontractors agree:

a. That any facility to be used in the performance of the contract or subcontract or to benefit from the contract is not listed on the Environmental Protection Agency (EPA) List of Violating Facilities;
b. To comply with all the requirements of Section 114 of the Clean Air Act, as amended, 42 U.S.C. 1857 et seq. and Section 308 of the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq. relating to inspection, monitoring, entry, reports, and information, as well as all other requirements specified

in Section 114 and Section 308 of the Acts, respectively, and all other regulations and guidelines issued thereunder;

c. That, as a condition for the award of this contract, the contractor or subcontractor will notify the awarding official of the receipt of any communication from the EPA indicating that a facility to be used for the performance of or benefit from the contract is under consideration to be listed on the EPA List of Violating Facilities;

d. To include or cause to be included in any construction contract or subcontract which exceeds $ 100,000 the aforementioned criteria and requirements.

SC-24 Airport and Airway Improvement Act of 1982, Section 520 - General Civil Rights Provisions

The contractor assures that it will comply with pertinent statutes, Executive orders, and such rules as are promulgated to assure that no person shall, on the grounds of race, creed, color, national origin, sex, age, or handicap be excluded from participating in any activity conducted with or benefiting from Federal assistance. This provision obligates the tenant/concessionaire/lessee or its transferee for the period during which Federal assistance is extended to the airport a program, except where Federal assistance is to provide, or is in the form of personal property or real property or interest therein or structures or improvements thereon. In these cases, the provision obligates the party or any transferee for the longer of the following periods:

(a) The period during which the property is used by the airport sponsor or any transferee for a purpose for which Federal assistance is extended, or for another purpose involving the provision of similar services or benefits or

(b) The period during which the airport sponsor or any transferee retains ownership or possession of the property. In the case of contractors, this provision binds the 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.

SC-25 Lobbying and Influencing Federal Employees

(1) No Federal appropriated funds shall be paid, by or on behalf of the contractor, 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 the making of any Federal grant and the amendment or modification of any Federal grant.

(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 any Federal grant, the contractor shall complete and submit Standard Form-LLL, "Disclosure of Lobby Activities," in accordance with its instructions.

SC-26 Energy Conservation Requirements

The contractor agrees to comply with mandatory standards and policies relating to energy efficiency that are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Public Law 94-163).

SC-27 Rights to Inventions

All rights to inventions and materials generated under this contract are subject to regulations issued by the FAA and the Sponsor of the Federal grant under which this contract is executed.

SC-28 Trade Restriction Clause

The contractor or subcontractor, by submission of an offer and/or execution of a contract, certifies that it:

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 published by the Office of the United States Trade Representative (USTR);

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 on said list, or is owned or controlled directly or indirectly by one or more citizens or nationals of a foreign country on said list;

c. 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.

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 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.

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 on the certification of a prospective subcontractor unless it has knowledge that the certification is erroneous.

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 written notice to the contractor if at any time it learns that its certification was erroneous by reason of changed circumstances.

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.

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.

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.

SC-29 Web-Based Project Information Management

The Contractor shall work with the Owner's web-based project information management system as directed. The project documentation requirements are described in Appendix A – Section 01322, Web-Based Project Information Management.

END OF SPECIAL CONDITIONS

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. Refer to Special Provision No. 7 for additional requirements for Record Drawings.

END OF SP-1

SPECIAL PROVISION NO. 2
AIRPORT SAFETY AND SECURITY REQUIREMENTS

A. General

The provisions of this safety and security plan and associated procedures are applicable within the boundaries of Northwest Florida Beaches International Airport. A complete understanding of all procedures and requirements contained herein is required to ensure safety and security during construction. Satisfying these safety and security requirements is a part of this contract and deviations from the requirements established herein will be sufficient cause for contract termination.

Required reference material associated with this safety plan includes:

FAA AC 150/5200-18C (or latest edition), Airport Safety Self Inspection
FAA AC 150/5370-2G (or latest edition), Operational Safety on Airport During Construction
FAA AC 150/5210-5D (or latest edition), Painting, Marking, and Lighting of Vehicles Used on an Airport

Copies of each of these documents may be examined through coordination with the Engineer.

B. Airport Safety and Security Coordinator

A qualified individual shall act as the duly authorized representative of the Contractor to coordinate safety and security issues for the duration of the contract. This individual will be responsible for the overall coordination of safety and security matters during construction and ensuring that all procedures and requirements are followed. The individual shall be physically present on the airport at all times during the period of construction when activity related to fulfilling the Contractor's responsibilities is taking place.

The individual shall be the Owner's point of contact and is also responsible for coordinating all construction activity with any organizations prior to the start of construction at any location within the Project Area, at any time the construction schedule or procedure that would affect safety or security is altered and upon completion of work. In addition, the Owner's point of contact shall maintain a file of all advisories issued; periodically review advisories issued to assure currency and appropriately cancel portions of previously issued advisories when construction covered by that advisory is completed or otherwise terminated.

C. Contractor Safety and Security Coordinator

The Contractor shall appoint a qualified individual as its duly authorized representative to coordinate safety and security issues for the duration of the contract. The Contractor's point of contact shall thoroughly understand the safety and security requirements of the contract and shall have sufficient authority to implement its provisions without significant deviation.

The Contractor shall be accountable for safety and security requirement compliance. The Contractor's point of contact for safety and security shall be especially knowledgeable regarding the requirements of FAA AC's 150/5200-18C and 150/5370-2G, Airport Self Inspection Guide and Operational Safety on Airports During Construction, respectively. The Contractor shall be thoroughly familiar with all contract requirements relevant to the handling of hazardous materials and all applicable trade practices related to maintain safety and security during construction.

D. Construction Sequence

The construction sequence defined in the plans and specifications has been developed to minimize possible adverse safety and security impacts. The Contractor may deviate from this sequence provided the Engineer authorizes the deviation in writing.

E. Traffic Control

1. Vehicle Identification - The Contractor shall establish and maintain a list of the minimum number of vehicles believed to be necessary for completing the work required in each area of construction. This list shall be submitted to the Owner for permission to operate each vehicle on the list. To be authorized to operate on Northwest Florida Beaches International Airport each vehicle shall:

   a. be marked/flagged for high daytime visibility and lighted for nighttime operations. These vehicles shall display in full view above the vehicle a 3'x3' or larger orange and white checkerboard flag, each check being 1' square, for daytime identification. For nighttime identification, each vehicle shall be equipped with a flashing amber (yellow) dome light, mounted on top of the vehicle and have an intensity that conforms to the requirement for maintenance or emergency vehicles. Vehicles that are not marked and/or lighted shall be escorted by a vehicle appropriately marked and/or lighted.

      In addition, vehicles authorized to operate on any portion of the airport operations area other than the approved haul route for this contract shall also be equipped with a two-way radio capable of communicating on the Airport frequency.

   All marking, lighting, installation of radios and similar safety and/or security measures including providing escort vehicles and properly trained radio operators shall be provided by the Contractor.

   b. be identified with the name and/or logo of the Contractor and be of sufficient size to be identified at a distance. Vehicles needing intermittent identification could be marked with tape or with commercially available magnetically attached markers. Vehicles that are not appropriately identified shall be escorted by a vehicle that conforms to this requirement. Vehicles requiring an escort shall be identified on the list.

   c. be operated in a manner that does not compromise the safety of either landside or airside airport operations. If, in the opinion of Airport staff or the Engineer, any vehicle is operated in a manner not fully consistent with these requirements, the Owner has the right to restrict operation of the vehicle or prohibit its use on the airport.

2. Access to the Site of Construction

   a. General Construction - the Contractor's access to the airport, employee parking and marshalling area(s) and route across the airport to the construction sites shall be as designated by the Owner. No other airport access point or cross-airport route shall be permitted unless approved in advance by the Owner. In addition, the following requirements are applicable:

(1) All Contractor traffic authorized to travel on the airport shall have been briefed as part of the Contractor's construction safety and security orientation program, be thoroughly familiar with the access procedures and route for travel or be escorted by personnel authorized by the Owner.

(2) The Contractor shall install work site identification signs at the authorized access point(s) if required by the Owner. If in the opinion of the Owner, directional signs are needed for clarity they shall be installed along the route authorized for access to each construction site.

(3) Under no circumstance will Contractor personnel be permitted to drive their individually owned vehicles to any construction on the airport. All vehicles must be parked in the area designated for employee parking; transportation to the work site shall be provided by the Contractor for those employees that are not otherwise occupying authorized vehicles.

(4) In addition to the periodic cleanup of the site, the Contractor is responsible for the immediate cleanup of any debris generated along the construction site access route(s) as a result of construction related traffic or operations whether or not created by Contractor personnel.

(5) There shall be no travel by foot within an active aircraft operational area. The Contractor shall arrange transportation for all employees between the designated marshalling area and each construction site, as necessary.

3. Material Suppliers, Subcontractors and Visitors - All material suppliers, subcontractors and visitors to the work site are obligated to follow the same safety and security operating procedures as the prime contractor. All material suppliers shall make their deliveries using the same access points and routes as the Contractor and shall be advised of the appropriate delivery procedures at the time the materials order is placed. If it is not practical to conform to the vehicle identification and/or safety and security orientation program requirements, the Contractor shall be prepared to escort all suppliers, subcontractors and visitors while they are on the work site or within a secured area.

F. Basis of Payment

No separate payment shall be made for airport safety and security measures or personnel or materials related to this item and incidentally required to satisfy the specified objective(s). Adequate compensation shall be included by the Contractor in the lump sum price for Mobilization. This compensation shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item. This compensation shall also be full compensation for adhering to Northwest Florida Beaches International Airport access requirements which include application for badges, time to procure a badge, and time required to badge subcontractors.

END OF SP-2

SPECIAL PROVISION NO. 3
PROTECTION OF AIRPORT CABLES, NAVAIDS AND OTHER FACILITIES

A. The Contractor is hereby informed that there are FAA NAVAID facilities installed on the Airport including, without limitation, ASR, UHF and VHF and VHF receivers and transmitters; U.S. Weather Bureau facilities; airfield lighting systems; electric cables and controls relating to such NAVAIDS and facilities. Such NAVAIDS, weather bureau and other facilities, and electric and control cables must be fully protected during the entire construction time. Work under this contract can be accomplished in the vicinity of these facilities and cables only at pre-approved periods of time.

Approval is subject to withdrawal at any time because of changes in the weather, emergency conditions on the airfield areas, anticipation of emergency conditions, and for any other reason determined by the Engineer acting under the orders and instructions of the airport management and the designated FAA representative. Any instruction to the Contractor to clear any given area, at any time, by the Engineer, the Airport Management, or the FAA (by radio or other means) shall be immediately executed. Construction work will be commenced in the cleared area only when additional instructions are issued by the Engineer.

B. Power and control cables leading to and from any FAA NAVAIDS, Weather Bureau, and other facilities, will be marked in the field by the local FAA Airway Facilities Sector personnel for the information of the Contractor, before starting any work in their general vicinity. Thereafter, through the entire time of this construction, the Contractor shall not allow any construction equipment to cross these cables without first protecting the cable with steel boiler plate, or similar structural devices, for three feet (3') either side of the marked cable route. All excavation within three feet (3') of existing cables shall be accomplished by hand digging only.

C. This Special Provision is included to make perfectly clear the need for protection of FAA NAVAIDS, Weather Bureau and other facilities and cables by the Contractor at all times.

D. At the option of the FAA, the Contractor shall either immediately repair, with identical material by skilled workmen, and at his own expense, any underground multi-conductor control cables serving FAA NAVAIDS, weather reporting equipment and other airport facilities which are damaged by its workmen or equipment. The FAA may repair the cable at the expense of the Contractor as verified by time and material expense records provided by FAA.

E. Prior approval from the Engineer and the FAA must be obtained for the materials, workmen, time of day or night and method of repairs for any temporary or permanent repairs the Contractor proposes to make to any FAA NAVAID or facility damaged by the Contractor. This also applies to any other airport facilities and/or cables damaged by the Contractor.

F. Should the repair require splicing, it shall be the discretion of the local FAA Airway Facilities Sector Manager as to who shall perform the work. Where the FAA performs the work, it shall be at the Contractor's expense.

G. No repair or splice work shall be backfilled or covered prior to final operational approval by the Airway Facilities Sector Manager.

END OF SP-3

SPECIAL PROVISION NO. 4
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-4

SPECIAL PROVISION NO. 5
VISIBLE WARNING MARKERS FOR TAXIWAYS
AND AIRCRAFT OPERATIONS AREAS

The Contractor shall furnish and maintain visible warning markers whenever any aircraft operations area (AOA) is closed to air traffic.

The Contractor shall place or remove the markers, at such times as the Engineer may direct, to allow the maximum use of the aircraft operations area by air traffic.

Contractor is responsible for maintaining markers in good condition at all times. Contractor shall repair and/or repaint markers as necessary or as directed by the Engineer.

Closed taxiways may be marked by appropriately placed barricades of the type shown on the contract drawings and as directed by the Engineer. Barricade lighting shall be red and shall be capable of being powered by battery or by connection to the runway, apron, or taxiway edge light circuit.

Cost of markers and barricades shall be incidental to construction costs for the project. Contractor shall provide his method and plan for markings to the Project Manager, in writing, for approval prior to mobilizing.

END OF SP-5

SPECIAL PROVISION NO. 6
TIME OF COMPLETION

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 = 14 **Calendar Days** (This is a calendar day contract);
   Total contract time = **59 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.

END OF SP-6

SPECIAL PROVISION NO. 7
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 weekly 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 the Weekly Schedule Updates.

1. If the Contractor's Weekly Schedule Updates reflect, 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. <u>Conservation and Salvage</u>

1. 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-7

SPECIAL PROVISION NO. 8
VEHICLE OPERATION ON THE AOA

A. Authorization of Vehicles/Equipment

All vehicles that enter the Air Operations Area of Northwest Florida Beaches International Airport shall comply with the following:

1. All vehicles shall be limited to designated access routes and/or construction areas unless specifically authorized by the Owner.
3. All construction vehicles/mechanized equipment authorized within the construction area, the Movement Area, or related safety areas shall be marked with a 3' x 3' orange and white checkered flag with each box being 1’ square, located on the upper most portion of the vehicle/motorized equipment, or be escorted by a vehicle so equipped.
4. All vehicles authorized to operate on the Movement Area or associated object free areas are required to announce their intentions on the Unicom frequency before entering those areas and to monitor the frequency.
5. During nighttime hours, all equipment operating or parked on the Airport exceeding 20 feet in height shall be lit with a red obstruction light in accordance with Advisory Circular 70/7460-1. This light is to be located on the uppermost portion of the equipment.

B: Vehicle/Equipment Restrictions

1. Bicycles, motorcycles and two-wheel scooters are prohibited on the AOA.

2. All vehicles/equipment must be appropriately secured such that neither aircraft nor wind blast will result in their movement.

C. Right-of-Way

Vehicles/equipment shall be operated in a manner that does not interfere with aircraft operations. All vehicles/equipment shall yield right of way to all aircraft and emergency vehicles.

D. Vehicle/Equipment Operating Rules

The Contractor shall be responsible for ensuring compliance with the following rules by all individuals authorized to drive outside the construction area:

1. Vehicle/mechanized equipment operators shall obey all traffic signs.

2. The established speed limit within the AOA -10 m.p.h.

3. At no time shall the operator of a vehicle/mechanized equipment drive under any portion of an aircraft.

4. A vehicle/equipment shall not stop or be parked:

a. so as to block a driveway, AOA access gate, fire lane, or aircraft;
b. in areas other than those prearranged and approved by the Owner;
c. within 15 feet of a fire hydrant, unless authorized by the Owner.

5. Vehicles/mechanized equipment shall not be operated in a careless or negligent manner within the AOA.

6. Vehicles/equipment shall not be operated by individuals under the influence of any substance which impairs the ability to do so in a safe manner.

E. Night or Low Visibility Operation

1. Vehicle/mechanized equipment operators are not permitted to move about the airport, outside the designated construction area at night unless the vehicle has operating headlights, taillights, brake lights or under the escort of a properly lighted vehicle. Headlights shall be set on dim when moving about the airport at night.

2. Vehicle/mechanized equipment authorized on the Movement Area and/or associated safety areas shall be equipped with an electrically powered, amber color, 360-degree omni-direction, rotating light, mounted on the vehicle such that it is conspicuous from any direction.

F. Runway/Taxiway Access

At no time shall a vehicle enter the Movement Area and/or associated safety areas unless it is authorized by the Owner.

G. Vehicle/Equipment Accidents

All accidents which involve bodily injury or property damage must be reported immediately to the Owner at 850-763-6751. Emergency 911 should be called where applicable.

H. Removal of Vehicle/Equipment

The Owner may remove or impound, at the owner's expense, any vehicle/equipment which is disabled, abandoned, improperly parked, or represents an operational hazard.

I. Insurance

All vehicles authorized driving privileges on the Airport are required to maintain vehicle liability coverage as established by the contract.

END OF SP-8

SPECIAL PROVISION NO. 9
FEDERAL LABOR AND EEO PROVISIONS
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.

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.~~

Veteran's Preference shall be included in all contracts for work on any project funded under this grant agreement which involves labor. Such provisions are necessary to insure that, in the employment of labor (except in executive, administrative, and supervisory positions), preference shall be given to Vietnam era veterans, Persian Gulf veterans, Afghanistan-Iraq war veterans, disabled veterans, and small business concerns owned and controlled by disabled veterans as defined in Title 49 United States Code, Section 47112. However, this preference shall apply only where the individuals are available and qualified to perform the work to which the employment relates.

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 1/4/13)

General Decision Number: FL130206 01/04/2013 FL206

Superseded General Decision Number: FL20120206

State: Florida

Construction Type: Highway

County: Bay County in Florida.

HIGHWAY CONSTRUCTION PROJECTS

Modification Number Publication Date
0 01/04/2013

SUFL2009-202 08/05/2009

	Rates	Fringes
CARPENTER	$ 13.03	1.05
CEMENT MASON/CONCRETE FINISHER	$ 10.06	0.00
ELECTRICIAN	$ 17.12	0.00
FORM WORKER	$ 12.29	0.00
HIGHWAY/PARKING LOT STRIPING: Operator (Striping Machine)	$ 11.97	2.23
HIGHWAY/PARKING LOT STRIPING: Painter	$ 13.31	0.00
IRONWORKER, REINFORCING	$ 14.50	1.37
IRONWORKER, STRUCTURAL	$ 16.75	3.88
LABORER: Asphalt Shoveler	$ 10.70	0.00
LABORER: Common or General	$ 8.30	0.00
LABORER: Flagger	$ 10.10	3.37
LABORER: Grade Checker	$ 10.50	0.55
LABORER: Landscape and Irrigation	$ 8.77	0.00
LABORER: Luteman	$ 10.32	0.00
LABORER: Mason Tender - Cement/Concrete	$ 12.00	1.80
LABORER: Pipelayer	$ 12.13	2.59

LABORER: Power Tool Operator
(Hand Held Drills/Saws,
Jackhammer and Power Saws.....$ 11.23 1.96

OPERATOR: Asphalt Plant.....$ 12.20 0.00

OPERATOR: Asphalt Spreader.....$ 10.76 0.00

OPERATOR: Auger.....$ 19.40 0.44

OPERATOR: Backhoe Loader
Combo.....$ 15.33 0.97

OPERATOR: Backhoe/Excavator.....$ 10.70 0.00

OPERATOR: Boom.....$ 16.61 0.00

OPERATOR: Bulldozer.....$ 14.18 2.56

OPERATOR: Crane.....$ 15.50 1.86

OPERATOR: Distributor.....$ 11.47 0.00

OPERATOR: Drill.....$ 13.00 1.59

OPERATOR: Grader/Blade.....$ 15.41 3.60

OPERATOR: Loader.....$ 9.66 0.00

OPERATOR: Mechanic.....$ 16.20 3.25

OPERATOR: Milling Machine.....$ 11.91 1.96

OPERATOR: Oiler.....$ 13.08 2.27

OPERATOR: Paver.....$ 9.78 0.00

OPERATOR: Piledriver.....$ 15.59 4.00

OPERATOR: Roller.....$ 8.82 0.00

OPERATOR: Scraper.....$ 10.70 1.60

OPERATOR: Screed..... $ 11.59 0.00

OPERATOR: Tractor.....$ 9.05 0.00

OPERATOR: Trencher. .....$ 13.41 0.49

PAINTER: Spray and Steel.....$ 16.62 0.00

TRUCK DRIVER: Distributor.....$ 11.30 2.26

TRUCK DRIVER: Dump Truck.....$ 8.66 0.00

TRUCK DRIVER: Lowboy Truck.....$ 12.19 0.00

TRUCK DRIVER: Material Truck....$ 12.76 9.80

TRUCK DRIVER: Tractor Haul
Truck.....$ 10.64 0.00

TRUCK DRIVER: Water Truck. ..... $ 10.50 0.00

TRUCK DRIVER: 10 Yard Haul
Away.....$ 12.50 0.00

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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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)).

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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 union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters, PLUM, indicate the international union and the four-digit number, 0198, that follows 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. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rates.

0000/9999: weighted union wage rates will be published annually each January.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union majority rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

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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

EQUAL EMPLOYMENT REQUIREMENTS

4.1 Requirement for Certification of Non-segregated 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:

Goal for DBE Participation
6.92%

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. 9

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).

The Panama City-Bay County Airport and Industrial District dba Northwest Florida Beaches International Airport is seeking sealed bids from qualified firms for all work and materials necessary to complete the Gate 7 Apron Repairs Project detailed on the Bid Package and Project Manual (Contract Documents) dated October 22, 2021. Interested Bidders may obtain the Contract Documents from the Business Opportunities section of the Airport's website: www.iflybeaches.com.

The work consists of repairs to the existing pavement that has developed cracks and ruts by a full removal of 780 SY of asphalt pavement and base material, and replacement with 16" Portland Cement Concrete (PCC) and specified base material.

A non-mandatory Pre-Bid meeting will be held November 2, 2021 at 2:00 pm (CT) at the north conference room, 1st floor of Terminal, Northwest Florida Beaches International Airport, 6300 West Bay Parkway. Call in number for this non-mandatory meeting is (712)-432-0900 (access code 225872). Sealed Bids must be submitted to the office above no later than November 16, 2021 at 2:00 pm (CT). Bids shall be made on the Bid Proposal Forms furnished in the Contract Documents.

Date October 21, 2021.

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
~~Special Provision No. 10: General Provisions and Requirements for Electrical Work~~
~~Special Provision No. 11: General Electrical Safety Requirements and Temporary Airfield Lighting~~
~~Special Provision No. 12: Alterations, Removal and Demolition~~
~~Special Provision No. 13: Submittals, Recoed Documents and Maintenance Manuals~~
~~Special Provision No. 14: Airfield Electrical Installation Testing~~

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

e. Runway – minimum five (5) per station

f. Taxiways – minimum three (3) per station

g. 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-110-1	**1 Way 2" Schedule 40 PVC Direct Earth Buried Duct**
L-125-1	**TAXIWAY EDGE LIGHT (CAN ONLY W/ CAPS)**

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.

Schedule	**Liquidated Damages Cost**	**Allowed Construction Time**

The maximum construction time allowed for the Schedule will be 59 days. 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:

$$X = (x_1 + x_2 + x_3 + \ldots x_n) / n$$

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.

$S_n = [((96.60 - 97.95)^2 + (97.55 - 97.95)^2 + (99.30 - 97.95)^2 + (98.35 - 97.95)^2)) / (4 - 1)]^{1/2}$

$S_n = [(1.82 + 0.16 + 1.82 + 0.16) / 3]^{1/2}$

$S_n = 1.15$

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.

$S_n = [((3.57 - 5.00)^2 + (3.57 - 3.74)^2 + (3.57 - 2.30)^2 + (3.57 - 3.25)^2) / (4 - 1)]^{1/2}$

$S_n = [(2.04 + 0.03 + 1.62 + 0.10) / 3]^{1/2}$

$S_n = 1.12$

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

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**
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
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

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**
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
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 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. Refer to Special Provision No. 7 for additional requirements for Record Drawings.

END OF SP-1

SPECIAL PROVISION NO. 2
AIRPORT SAFETY AND SECURITY REQUIREMENTS

A. General

The provisions of this safety and security plan and associated procedures are applicable within the boundaries of Northwest Florida Beaches International Airport. A complete understanding of all procedures and requirements contained herein is required to ensure safety and security during construction. Satisfying these safety and security requirements is a part of this contract and deviations from the requirements established herein will be sufficient cause for contract termination.

Required reference material associated with this safety plan includes:

FAA AC 150/5200-18C (or latest edition), Airport Safety Self Inspection
FAA AC 150/5370-2G (or latest edition), Operational Safety on Airport During Construction
FAA AC 150/5210-5D (or latest edition), Painting, Marking, and Lighting of Vehicles Used on an Airport

Copies of each of these documents may be examined through coordination with the Engineer.

B. Airport Safety and Security Coordinator

A qualified individual shall act as the duly authorized representative of the Contractor to coordinate safety and security issues for the duration of the contract. This individual will be responsible for the overall coordination of safety and security matters during construction and ensuring that all procedures and requirements are followed. The individual shall be physically present on the airport at all times during the period of construction when activity related to fulfilling the Contractor's responsibilities is taking place.

The individual shall be the Owner's point of contact and is also responsible for coordinating all construction activity with any organizations prior to the start of construction at any location within the Project Area, at any time the construction schedule or procedure that would affect safety or security is altered and upon completion of work. In addition, the Owner's point of contact shall maintain a file of all advisories issued; periodically review advisories issued to assure currency and appropriately cancel portions of previously issued advisories when construction covered by that advisory is completed or otherwise terminated.

C. Contractor Safety and Security Coordinator

The Contractor shall appoint a qualified individual as its duly authorized representative to coordinate safety and security issues for the duration of the contract. The Contractor's point of contact shall thoroughly understand the safety and security requirements of the contract and shall have sufficient authority to implement its provisions without significant deviation.

The Contractor shall be accountable for safety and security requirement compliance. The Contractor's point of contact for safety and security shall be especially knowledgeable regarding the requirements of FAA AC's 150/5200-18C and 150/5370-2G, Airport Self Inspection Guide and Operational Safety on Airports During Construction, respectively. The Contractor shall be thoroughly familiar with all contract requirements relevant to the handling of hazardous materials and all applicable trade practices related to maintain safety and security during construction.

D. Construction Sequence

The construction sequence defined in the plans and specifications has been developed to minimize possible adverse safety and security impacts. The Contractor may deviate from this sequence provided the Engineer authorizes the deviation in writing.

E. Traffic Control

1. Vehicle Identification - The Contractor shall establish and maintain a list of the minimum number of vehicles believed to be necessary for completing the work required in each area of construction. This list shall be submitted to the Owner for permission to operate each vehicle on the list. To be authorized to operate on Northwest Florida Beaches International Airport each vehicle shall:

   a. be marked/flagged for high daytime visibility and lighted for nighttime operations. These vehicles shall display in full view above the vehicle a 3'x3' or larger orange and white checkerboard flag, each check being 1' square, for daytime identification. For nighttime identification, each vehicle shall be equipped with a flashing amber (yellow) dome light, mounted on top of the vehicle and have an intensity that conforms to the requirement for maintenance or emergency vehicles. Vehicles that are not marked and/or lighted shall be escorted by a vehicle appropriately marked and/or lighted.

      In addition, vehicles authorized to operate on any portion of the airport operations area other than the approved haul route for this contract shall also be equipped with a two-way radio capable of communicating on the Airport frequency.

   All marking, lighting, installation of radios and similar safety and/or security measures including providing escort vehicles and properly trained radio operators shall be provided by the Contractor.

   b. be identified with the name and/or logo of the Contractor and be of sufficient size to be identified at a distance. Vehicles needing intermittent identification could be marked with tape or with commercially available magnetically attached markers. Vehicles that are not appropriately identified shall be escorted by a vehicle that conforms to this requirement. Vehicles requiring an escort shall be identified on the list.

   c. be operated in a manner that does not compromise the safety of either landside or airside airport operations. If, in the opinion of Airport staff or the Engineer, any vehicle is operated in a manner not fully consistent with these requirements, the Owner has the right to restrict operation of the vehicle or prohibit its use on the airport.

2. Access to the Site of Construction

   a. General Construction - the Contractor's access to the airport, employee parking and marshalling area(s) and route across the airport to the construction sites shall be as designated by the Owner. No other airport access point or cross-airport route shall be permitted unless approved in advance by the Owner. In addition, the following requirements are applicable:

(1) All Contractor traffic authorized to travel on the airport shall have been briefed as part of the Contractor's construction safety and security orientation program, be thoroughly familiar with the access procedures and route for travel or be escorted by personnel authorized by the Owner.

(2) The Contractor shall install work site identification signs at the authorized access point(s) if required by the Owner. If in the opinion of the Owner, directional signs are needed for clarity they shall be installed along the route authorized for access to each construction site.

(3) Under no circumstance will Contractor personnel be permitted to drive their individually owned vehicles to any construction on the airport. All vehicles must be parked in the area designated for employee parking; transportation to the work site shall be provided by the Contractor for those employees that are not otherwise occupying authorized vehicles.

(4) In addition to the periodic cleanup of the site, the Contractor is responsible for the immediate cleanup of any debris generated along the construction site access route(s) as a result of construction related traffic or operations whether or not created by Contractor personnel.

(5) There shall be no travel by foot within an active aircraft operational area. The Contractor shall arrange transportation for all employees between the designated marshalling area and each construction site, as necessary.

3. Material Suppliers, Subcontractors and Visitors - All material suppliers, subcontractors and visitors to the work site are obligated to follow the same safety and security operating procedures as the prime contractor. All material suppliers shall make their deliveries using the same access points and routes as the Contractor and shall be advised of the appropriate delivery procedures at the time the materials order is placed. If it is not practical to conform to the vehicle identification and/or safety and security orientation program requirements, the Contractor shall be prepared to escort all suppliers, subcontractors and visitors while they are on the work site or within a secured area.

F. Basis of Payment

No separate payment shall be made for airport safety and security measures or personnel or materials related to this item and incidentally required to satisfy the specified objective(s). Adequate compensation shall be included by the Contractor in the lump sum price for Mobilization. This compensation shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item. This compensation shall also be full compensation for adhering to Northwest Florida Beaches International Airport access requirements which include application for badges, time to procure a badge, and time required to badge subcontractors.

END OF SP-2

SPECIAL PROVISION NO. 3
PROTECTION OF AIRPORT CABLES, NAVAIDS AND OTHER FACILITIES

A. The Contractor is hereby informed that there are FAA NAVAID facilities installed on the Airport including, without limitation, ASR, UHF and VHF and VHF receivers and transmitters; U.S. Weather Bureau facilities; airfield lighting systems; electric cables and controls relating to such NAVAIDS and facilities. Such NAVAIDS, weather bureau and other facilities, and electric and control cables must be fully protected during the entire construction time. Work under this contract can be accomplished in the vicinity of these facilities and cables only at pre-approved periods of time.

Approval is subject to withdrawal at any time because of changes in the weather, emergency conditions on the airfield areas, anticipation of emergency conditions, and for any other reason determined by the Engineer acting under the orders and instructions of the airport management and the designated FAA representative. Any instruction to the Contractor to clear any given area, at any time, by the Engineer, the Airport Management, or the FAA (by radio or other means) shall be immediately executed. Construction work will be commenced in the cleared area only when additional instructions are issued by the Engineer.

B. Power and control cables leading to and from any FAA NAVAIDS, Weather Bureau, and other facilities, will be marked in the field by the local FAA Airway Facilities Sector personnel for the information of the Contractor, before starting any work in their general vicinity. Thereafter, through the entire time of this construction, the Contractor shall not allow any construction equipment to cross these cables without first protecting the cable with steel boiler plate, or similar structural devices, for three feet (3') either side of the marked cable route. All excavation within three feet (3') of existing cables shall be accomplished by hand digging only.

C. This Special Provision is included to make perfectly clear the need for protection of FAA NAVAIDS, Weather Bureau and other facilities and cables by the Contractor at all times.

D. At the option of the FAA, the Contractor shall either immediately repair, with identical material by skilled workmen, and at his own expense, any underground multi-conductor control cables serving FAA NAVAIDS, weather reporting equipment and other airport facilities which are damaged by its workmen or equipment. The FAA may repair the cable at the expense of the Contractor as verified by time and material expense records provided by FAA.

E. Prior approval from the Engineer and the FAA must be obtained for the materials, workmen, time of day or night and method of repairs for any temporary or permanent repairs the Contractor proposes to make to any FAA NAVAID or facility damaged by the Contractor. This also applies to any other airport facilities and/or cables damaged by the Contractor.

F. Should the repair require splicing, it shall be the discretion of the local FAA Airway Facilities Sector Manager as to who shall perform the work. Where the FAA performs the work, it shall be at the Contractor's expense.

G. No repair or splice work shall be backfilled or covered prior to final operational approval by the Airway Facilities Sector Manager.

END OF SP-3

SPECIAL PROVISION NO. 4
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-4

SPECIAL PROVISION NO. 5
VISIBLE WARNING MARKERS FOR TAXIWAYS
AND AIRCRAFT OPERATIONS AREAS

The Contractor shall furnish and maintain visible warning markers whenever any aircraft operations area (AOA) is closed to air traffic.

The Contractor shall place or remove the markers, at such times as the Engineer may direct, to allow the maximum use of the aircraft operations area by air traffic.

Contractor is responsible for maintaining markers in good condition at all times. Contractor shall repair and/or repaint markers as necessary or as directed by the Engineer.

Closed taxiways may be marked by appropriately placed barricades of the type shown on the contract drawings and as directed by the Engineer. Barricade lighting shall be red and shall be capable of being powered by battery or by connection to the runway, apron, or taxiway edge light circuit.

Cost of markers and barricades shall be incidental to construction costs for the project. Contractor shall provide his method and plan for markings to the Project Manager, in writing, for approval prior to mobilizing.

END OF SP-5

SPECIAL PROVISION NO. 6
TIME OF COMPLETION

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 = 14 **Calendar Days** (This is a calendar day contract);
   Total contract time = **59 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.

END OF SP-6

SPECIAL PROVISION NO. 7
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 weekly 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 the Weekly Schedule Updates.

1. If the Contractor's Weekly Schedule Updates reflect, 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. <u>Conservation and Salvage</u>

1. 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-7

SPECIAL PROVISION NO. 8
VEHICLE OPERATION ON THE AOA

A. Authorization of Vehicles/Equipment

All vehicles that enter the Air Operations Area of Northwest Florida Beaches International Airport shall comply with the following:

1. All vehicles shall be limited to designated access routes and/or construction areas unless specifically authorized by the Owner.
3. All construction vehicles/mechanized equipment authorized within the construction area, the Movement Area, or related safety areas shall be marked with a 3' x 3' orange and white checkered flag with each box being 1’ square, located on the upper most portion of the vehicle/motorized equipment, or be escorted by a vehicle so equipped.
4. All vehicles authorized to operate on the Movement Area or associated object free areas are required to announce their intentions on the Unicom frequency before entering those areas and to monitor the frequency.
5. During nighttime hours, all equipment operating or parked on the Airport exceeding 20 feet in height shall be lit with a red obstruction light in accordance with Advisory Circular 70/7460-1. This light is to be located on the uppermost portion of the equipment.

B: Vehicle/Equipment Restrictions

1. Bicycles, motorcycles and two-wheel scooters are prohibited on the AOA.

2. All vehicles/equipment must be appropriately secured such that neither aircraft nor wind blast will result in their movement.

C. Right-of-Way

Vehicles/equipment shall be operated in a manner that does not interfere with aircraft operations. All vehicles/equipment shall yield right of way to all aircraft and emergency vehicles.

D. Vehicle/Equipment Operating Rules

The Contractor shall be responsible for ensuring compliance with the following rules by all individuals authorized to drive outside the construction area:

1. Vehicle/mechanized equipment operators shall obey all traffic signs.

2. The established speed limit within the AOA -10 m.p.h.

3. At no time shall the operator of a vehicle/mechanized equipment drive under any portion of an aircraft.

4. A vehicle/equipment shall not stop or be parked:

a. so as to block a driveway, AOA access gate, fire lane, or aircraft;
b. in areas other than those prearranged and approved by the Owner;
c. within 15 feet of a fire hydrant, unless authorized by the Owner.

5. Vehicles/mechanized equipment shall not be operated in a careless or negligent manner within the AOA.

6. Vehicles/equipment shall not be operated by individuals under the influence of any substance which impairs the ability to do so in a safe manner.

E. Night or Low Visibility Operation

1. Vehicle/mechanized equipment operators are not permitted to move about the airport, outside the designated construction area at night unless the vehicle has operating headlights, taillights, brake lights or under the escort of a properly lighted vehicle. Headlights shall be set on dim when moving about the airport at night.

2. Vehicle/mechanized equipment authorized on the Movement Area and/or associated safety areas shall be equipped with an electrically powered, amber color, 360-degree omni-direction, rotating light, mounted on the vehicle such that it is conspicuous from any direction.

F. Runway/Taxiway Access

At no time shall a vehicle enter the Movement Area and/or associated safety areas unless it is authorized by the Owner.

G. Vehicle/Equipment Accidents

All accidents which involve bodily injury or property damage must be reported immediately to the Owner at 850-763-6751. Emergency 911 should be called where applicable.

H. Removal of Vehicle/Equipment

The Owner may remove or impound, at the owner's expense, any vehicle/equipment which is disabled, abandoned, improperly parked, or represents an operational hazard.

I. Insurance

All vehicles authorized driving privileges on the Airport are required to maintain vehicle liability coverage as established by the contract.

END OF SP-8

SPECIAL PROVISION NO. 9
FEDERAL LABOR AND EEO PROVISIONS
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.

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.~~

Veteran's Preference shall be included in all contracts for work on any project funded under this grant agreement which involves labor. Such provisions are necessary to insure that, in the employment of labor (except in executive, administrative, and supervisory positions), preference shall be given to Vietnam era veterans, Persian Gulf veterans, Afghanistan-Iraq war veterans, disabled veterans, and small business concerns owned and controlled by disabled veterans as defined in Title 49 United States Code, Section 47112. However, this preference shall apply only where the individuals are available and qualified to perform the work to which the employment relates.

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 1/4/13)

General Decision Number: FL130206 01/04/2013 FL206

Superseded General Decision Number: FL20120206

State: Florida

Construction Type: Highway

County: Bay County in Florida.

HIGHWAY CONSTRUCTION PROJECTS

Modification Number Publication Date
0 01/04/2013

SUFL2009-202 08/05/2009

	Rates	Fringes
CARPENTER	$ 13.03	1.05
CEMENT MASON/CONCRETE FINISHER	$ 10.06	0.00
ELECTRICIAN	$ 17.12	0.00
FORM WORKER	$ 12.29	0.00
HIGHWAY/PARKING LOT STRIPING: Operator (Striping Machine)	$ 11.97	2.23
HIGHWAY/PARKING LOT STRIPING: Painter	$ 13.31	0.00
IRONWORKER, REINFORCING	$ 14.50	1.37
IRONWORKER, STRUCTURAL	$ 16.75	3.88
LABORER: Asphalt Shoveler	$ 10.70	0.00
LABORER: Common or General	$ 8.30	0.00
LABORER: Flagger	$ 10.10	3.37
LABORER: Grade Checker	$ 10.50	0.55
LABORER: Landscape and Irrigation	$ 8.77	0.00
LABORER: Luteman	$ 10.32	0.00
LABORER: Mason Tender - Cement/Concrete	$ 12.00	1.80
LABORER: Pipelayer	$ 12.13	2.59

LABORER: Power Tool Operator
(Hand Held Drills/Saws,
Jackhammer and Power Saws.....$ 11.23 1.96

OPERATOR: Asphalt Plant.....$ 12.20 0.00

OPERATOR: Asphalt Spreader.....$ 10.76 0.00

OPERATOR: Auger.....$ 19.40 0.44

OPERATOR: Backhoe Loader
Combo.....$ 15.33 0.97

OPERATOR: Backhoe/Excavator.....$ 10.70 0.00

OPERATOR: Boom.....$ 16.61 0.00

OPERATOR: Bulldozer.....$ 14.18 2.56

OPERATOR: Crane.....$ 15.50 1.86

OPERATOR: Distributor.....$ 11.47 0.00

OPERATOR: Drill.....$ 13.00 1.59

OPERATOR: Grader/Blade.....$ 15.41 3.60

OPERATOR: Loader.....$ 9.66 0.00

OPERATOR: Mechanic.....$ 16.20 3.25

OPERATOR: Milling Machine.....$ 11.91 1.96

OPERATOR: Oiler.....$ 13.08 2.27

OPERATOR: Paver.....$ 9.78 0.00

OPERATOR: Piledriver.....$ 15.59 4.00

OPERATOR: Roller.....$ 8.82 0.00

OPERATOR: Scraper.....$ 10.70 1.60

OPERATOR: Screed..... $ 11.59 0.00

OPERATOR: Tractor.....$ 9.05 0.00

OPERATOR: Trencher. .....$ 13.41 0.49

PAINTER: Spray and Steel.....$ 16.62 0.00

TRUCK DRIVER: Distributor.....$ 11.30 2.26

TRUCK DRIVER: Dump Truck.....$ 8.66 0.00

TRUCK DRIVER: Lowboy Truck.....$ 12.19 0.00

TRUCK DRIVER: Material Truck....$ 12.76 9.80

TRUCK DRIVER: Tractor Haul
Truck.....$ 10.64 0.00

TRUCK DRIVER: Water Truck. ..... $ 10.50 0.00

TRUCK DRIVER: 10 Yard Haul
Away.....$ 12.50 0.00

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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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)).

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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 union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters, PLUM, indicate the international union and the four-digit number, 0198, that follows 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. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rates.

0000/9999: weighted union wage rates will be published annually each January.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union majority rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

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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

EQUAL EMPLOYMENT REQUIREMENTS

4.1 Requirement for Certification of Non-segregated 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:

Goal for DBE Participation
6.92%

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. 9

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).

The Panama City-Bay County Airport and Industrial District dba Northwest Florida Beaches International Airport is seeking sealed bids from qualified firms for all work and materials necessary to complete the Gate 7 Apron Repairs Project detailed on the Bid Package and Project Manual (Contract Documents) dated October 22, 2021. Interested Bidders may obtain the Contract Documents from the Business Opportunities section of the Airport's website: www.iflybeaches.com.

The work consists of repairs to the existing pavement that has developed cracks and ruts by a full removal of 780 SY of asphalt pavement and base material, and replacement with 16" Portland Cement Concrete (PCC) and specified base material.

A non-mandatory Pre-Bid meeting will be held November 2, 2021 at 2:00 pm (CT) at the north conference room, 1st floor of Terminal, Northwest Florida Beaches International Airport, 6300 West Bay Parkway. Call in number for this non-mandatory meeting is (712)-432-0900 (access code 225872). Sealed Bids must be submitted to the office above no later than November 16, 2021 at 2:00 pm (CT). Bids shall be made on the Bid Proposal Forms furnished in the Contract Documents.

Date October 21, 2021.

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
~~Special Provision No. 10: General Provisions and Requirements for Electrical Work~~
~~Special Provision No. 11: General Electrical Safety Requirements and Temporary Airfield Lighting~~
~~Special Provision No. 12: Alterations, Removal and Demolition~~
~~Special Provision No. 13: Submittals, Recoed Documents and Maintenance Manuals~~
~~Special Provision No. 14: Airfield Electrical Installation Testing~~

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

e. Runway – minimum five (5) per station

f. Taxiways – minimum three (3) per station

g. 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-110-1	**1 Way 2" Schedule 40 PVC Direct Earth Buried Duct**
L-125-1	**TAXIWAY EDGE LIGHT (CAN ONLY W/ CAPS)**

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.

Schedule	**Liquidated Damages Cost**	**Allowed Construction Time**

The maximum construction time allowed for the Schedule will be 59 days. 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:

$$X = (x_1 + x_2 + x_3 + \ldots x_n) / n$$

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.

$S_n = [((96.60 - 97.95)^2 + (97.55 - 97.95)^2 + (99.30 - 97.95)^2 + (98.35 - 97.95)^2)) / (4 - 1)]^{1/2}$

$S_n = [(1.82 + 0.16 + 1.82 + 0.16) / 3]^{1/2}$

$S_n = 1.15$

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.

$S_n = [((3.57 - 5.00)^2 + (3.57 - 3.74)^2 + (3.57 - 2.30)^2 + (3.57 - 3.25)^2) / (4 - 1)]^{1/2}$

$S_n = [(2.04 + 0.03 + 1.62 + 0.10) / 3]^{1/2}$

$S_n = 1.12$

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

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**
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
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

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**
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
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

SECTION 011000 - SUMMARY

PART 1 - GENERAL

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work under separate contracts.
4. Building Permits and Inspections by the Authority Having Jurisdiction.
5. Access to site.
6. Coordination with occupants.
7. Work restrictions.
8. Specification and drawing conventions.
9. Miscellaneous provisions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.2 PROJECT INFORMATION

A. Project Identification: Panama City Airport - NWFBI – Nort Terminal Expansion

B. PROJECT INFORMATION

C. Project Identification: Panama City Airport - NWFBI

D. Project Location: 6300 West Bay Parkway
Panama City, Florida 32409

E. Owner: Northwest Florida Beaches International Airport - NWFBI

F. Architect:
Fitzgerald Collaborative Group-LLC
850 South Gadsden Street -Suite 140,
Tallahassee, Florida 32301
Donald Gray, AIA – Principal in Charge
Erika Hagen, AIA – Project Manager

G. WORK COVERED BY CONTRACT DOCUMENTS

H. Work includes but is ot necessarily limited to, the following:
1. The project intent is to replicate existing construction practices and finishes to installing a new baggage carousel in a similar size and shape as the existing baggage carousel slab • Future slab in this area of work to be 18” lower (phase 1 Project information.

2. Work covered by Contract Documents.
3. Work under separate contracts.
4. Building Permits and Inspections by the Authority Having Jurisdiction.
5. Access to site.
6. Coordination with occupants.
7. Work restrictions.
8. Specification and drawing conventions.
9. Miscellaneous provisions.
10. Construct new footing and tie-in details to accommodate future slab elevation. Construct new superstructure with steel moment frames and movement joints where tying into the existing north and east structures. Removal and relocation of the existing aesthetic steel truss to the south end of the new building. Sloping roof and flat roof to be a combination of steel beams and steel bar joists spaced at approximately 5'-0" o.c. Sister columns will be placed directly adjacent to existing columns on the east and north ends to allow for maximum openings in the existing infill walls to connect the adjoining spaces. New columns will bear on existing column foundations and existing footings will be increased in size as required by design • All light gauge framing will be a delegated item designed by a light gauge specialty engineer. Entry feature on west side of new building will match existing canopy framing. Demolish existing infill masonry walls where required to adjoin all three spaces.
11. Electrical: The new approximately baggage claim expansion will be served by a complete and operable electrical system The new expansion will tie into the existing electrical, fire alarm, security and communications system serving the rest of the building. The design includes but is not necessarily limited to demolition and relocation of existing panels, disconnects, fixtures and devices. Power for new expansion will be fed from existing 2500A, 480/277 volts, 3 phase, 4 wire Switchboard 'MSB1' located in Main Electrical Room 1308. Electrical distribution system including feeders, panelboards, distribution boards, surge suppression, etc. All feeders and wiring will be installed in conduit. Panelboards will be Square D NQOD panelboards or equal. Complete lighting system including switching controls, site lighting, building exterior lighting and emergency lighting systems. New lighting system will meet Florida Building Code (FBC) Energy Conservation Code. New Lighting systems will be energy efficient and designed in accordance with state and local energy codes and ordinances.
12. Lamp sources will be LED. Lighting controls will tie into the existing lighting control panel to provide automatic control required by FBC
13. Energy Conservation Code. All lighting spaces will have a manual override so users can control the lighting in each space.
14. Individual spaces, offices, and restrooms will utilize occupancy sensors with power packs and manual override switches.
15. Complete building system of receptacle outlets, flush wall or floor mounted as required.
16. Wiring and connection of all building service equipment such as heating, ventilation, air conditioning, owner furnished and plumbing equipment.
17. Fire alarm system. Install new addressable fire alarm devices compatible with existing fire alarm in place with voice evacuation capabilities. Fire alarm system and devices will be installed to meet Florida Building Code and NFPA 101.

18. Electrical Characteristics. The baggage expansion will be served from two 480/277 volt, 2500A, 3 phase, 4 wire, service entrance rated, Main Switchboards in Electric Room 1308. All service equipment, mechanical power, and lighting systems will operate at this voltage. All receptacle loads and small appliances will be served from a 120/208 volts, 3 phase, 4 wire system. Dry-type transformers will be provided to accommodate the 120/208 volt panelboards. A stand-by back-up power automatic transfer switch will be provided for emergency power. Emergency back-up power will come from the existing 700kW generator just outside the main electrical room.

19.19.

20.20.

21. GROUNDING Description of System: In general, all electrical equipment (metallic conduit, motor frames, panelboards, etc.) will be bonded together with a green insulated or bare copper system grounding conductor in accordance with specific rules of Article 250 of the N.E.C. Equipment grounding conductors though the raceway system will be continuous from main switch ground bus to panel ground bar of each panelboard, and from panel grounding bar of each panelboard to branch circuit equipment and devices. A ground bar for each telephone/data room and the IT Server Room will be provided Lighting controls will tie into the existing lighting control panel to provide automatic control required by FBC Energy Conservation Code. All lighting spaces will have a manual override so users can control the lighting in each space. Individual spaces, offices, and restrooms will utilize occupancy sensors with power packs and manual override switches.

22. Fire Alarm • The new expansion will include life safety components and devices compatible with the existing fire alarm detection and annunciation system. The new expansion will be monitored with detection and signaling devices including smoke detectors, heat detectors, duct smoke detectors, manual pull stations, etc. Fire alarm system functions will be as follows: Alarm Initiating Alarm Signaling, Emergency Voice Communications (recorded message/speaker system).
23. The baggage handling expansion shall have ventilation only utilizing exhaust fans and gravity ventilators. Existing ducting from gravity ventilators to be relocated. Plumbing systems shall consist of new trench drains and underground oil interceptor connecting to existing sanitary piping. Existing trap primer shall be relocated and new water routed for new trap primer for new trench drains. Fire sprinkler systems shall be modified to provide full protection for new addition. Refer to the remainder of this document for guidelines on materials and methods of construction. Codes and Standards All work shall comply with the following codes and standards

I. Type of Contract.

1. Project will be constructed under a single prime contract.

1.3 CONSTRUCTION AREA

A. Substantial completion and beneficial occupancy

1. There will be a single date of substantial completion for the project.
2. All warranties shall commence on the date of substantial completion, as established by the Architect and Owner. The use of shipping dates, delivery dates manufacturing dates are not acceptable for implementation of warranties.
3. The contractor shall be responsible for obtaining a certificate of occupancy or an equivalent document from the Authorities Having Jurisdiction as required prior to substantial occupancy and the movement of personnel within the building.

B. Preconstruction requirement: Prior to the pre-construction conference and commencing Work, the contractor shall submit to the Architect and Owner a copy of Contractor's construction schedule showing the sequence, commencement and completion dates, and move-out and -in dates of Owner's personnel for the Work.

C. BUILDING PERMITS AND INSPECTIONS BY THE AUTHORITY HAVING JURISDICTION
1.
1. The Local Building Department is the Authority Having Jurisdiction for all local permits.
2. The contractor shall make application for all necessary permits required by the Building Department. The cost for all permits shall be included in the base bid.

3. The contractor shall be responsible for requesting and scheduling all inspections by the Authorities Having Jurisdiction.
4. Permit Inspections required, the Contractor shall coordinate with:
5. Coordinate with the local Building Department.

D. ACCESS TO SITE

E. General: Contractor shall have use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project. The Owner shall occupy the site during construction.

F. Limits: Confine construction operations to the limits shown:.

1. Driveways, Walkways and Entrances: Keep driveways**,** and entrances serving premises clear and available to Owner, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

G. Owner Occupancy: The building will not be occupied during the construction period.

1.4 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify **Owner** not less than **seven** days in advance of proposed utility interruptions.
2. Obtain **Owner's** written permission before proceeding with utility interruptions.

C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify **Owner** not less than **two** days in advance of proposed disruptive operations.
2. Obtain **Owner's** written permission before proceeding with disruptive operations.

D. Non-smoking Building: Smoking is not permitted within any buildings on-site or within 25 feet (8 m) of entrances, operable windows, or outdoor-air intakes.

E. Controlled Substances: Use of tobacco products and other controlled substances **within the building** or **on Project site** is not permitted.

1.5 SPECIFICATION AND DRAWING CONVENTIONS

A. 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. Imperative mood and streamlined language are generally used in the Specifications. 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.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations **published as part of the U.S. National CAD Standard and scheduled on Drawings**.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.Section Includes:
4. Project information.

5. Work covered by Contract Documents.
6. Work under separate contracts.
7. Building Permits and Inspections by the Authority Having Jurisdiction.
8. Access to site.
9. Coordination with occupants.
10. Work restrictions.
11. Specification and drawing conventions.
12. Miscellaneous provisions.
13.

D. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 11 00 – PRODUCT EVALUATION AND APPROVAL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Florida Product Evaluation and Approval.

1.2 REFERENCES

A. Florida Statute 553.842

B. Florida Administrative Code 9B-72

C. Definition: Product evaluation and approval system that applies statewide to concurrent with the Florida Building Code.

1.3 RESPONSIBILITY

A. The Contractor is responsible for providing products approved by the State of Florida with approval numbers. Do not use products that do not have a Florida approval number.

1.4 SUBMITTAL

A. Submit a copy of the approved product schedule, (attached at the end of this section), to the Architect within thirty (30) days after project has been awarded. In addition to State requirements comply with the requirements of the local jurisdiction of the project.

B. Submit the following product approval specification sheet, or local jurisdiction form to obtain building permits.

1.5 CATEGORIES

A. General: Products, methods, or systems of construction, used in the exterior envelope of a building must be approved by the Building Department. The products covered are those products, methods or systems that affect the structural integrity of the building envelope, including but not limited to the following categories.

1. Panel Walls.
2. Exterior Doors
3. Roofing Products.
4. Skylights
5. Windows
6. Shutters
7. Structural Components
8. New and Innovative Building Envelope Products.

B. If the Contractor fails to comply with this requirement, non-complying components shall be removed and replaced with components that do comply at no expense to the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PRODUCT APPROVAL SPECIFICATION SHEET

Location:_____ Project:

_____

Name:_____

As required by Florida Statute 553.842 and Florida Administrative Code 9B-72, please provide the information and the product approval number(s) on the building components listed below if they will be utilized on the construction project for which you are applying for a building permit. We recommend you contact your local product supplier should you not know the product approval number for any of the applicable listed products. More information about statewide product approval can be obtained at www.floridabuilding.org. Complete the following table with products to be used on this project. If not required for this project, mark as Not Applicable, (N/A), add products that may not be listed, but are required for the project, .submit to Architect and Authority Having Jurisdiction.

Category/Subcategory	Manufacturer	Product Description	Approval Number(s)
A. EXTERIOR DOORS			
1. Swinging			
2. Sliding			
3. Sectional			
4. Roll up			
5. Automatic			
6. Other			
B. WINDOWS			
1. Single hung			
2. Horizontal Slider			
3. Casement			
4. Double Hung			
5. Fixed			
6. Awning			
7. Pass -through			
8. Projected			
9. Mullion			
10. Wind Breaker			
11 Dual Action			
12. Other			
C. PANEL WALL			
1. Siding			
2. Soffits			
3. EIFS			
4. Storefronts			
5. Curtain walls			
6. Wall louver			
7. Glass block			
8. Membrane			
9. Greenhouse			
10. Other			
Category/Subcategory (cont.)	Manufacturer	Product Description	Approval Number(s)

D. ROOFING PRODUCTS			
1. Asphalt Shingles			
2. Underlayments			
3. Roofing Fasteners			
4. Non-structural Metal Roof			
5. Built-Up Roofing			
6. Modified Bitumen			
7. Single Ply Roofing Sys			
8. Roofing Tiles			
9. Roofing Insulation			
10. Waterproofing			
11. Wood shingles /shakes			
12. Roofing Slate			
13. Liquid Applied Roof Sys			
14. Cements-Adhesives – Coatings			
15. Roof Tile Adhesive			
16. Spray Applied Polyurethane Roof			
17. Other			
E. SHUTTERS			
1. Accordion			
2. Bahama			
3. Storm Panels			
4. Colonial			
5. Roll-up			
6. Equipment			
7. Others			
F. SKYLIGHTS			
1. Skylight			
2. Other			
Category/Subcategory (cont.)	Manufacturer	Product Description	Approval Number(s)

G. STRUCTURAL COMPONENTS			
1. Wood connector/anchor			
2. Truss plates			
3. Engineered lumber			
4. Railing			
5. Coolers-freezers			
6. Concrete Admixtures			
7. Material			
8. Insulation Forms			
9. Plastics			
10. Deck-Roof			
11. Wall			
12. Sheds			
13. Other			
H. NEW EXTERIOR ENVELOPE PRODUCTS			
1.			-
2.			

The products listed below did not demonstrate product approval at plan review. I understand that at the time of inspection of these products, the following information must be available to the inspector on the jobsite; 1) copy of the product approval, 2) the performance characteristics which the product was tested and certified to comply with, 3) copy of the applicable manufacturer's installation requirements.
I understand these products may have to be removed if approval cannot be demonstrated during inspection.

_____ _____
Contractor or Contractor's Authorized Agent Signature Print Name

Date _____
_____
Permit #

END OF SECTION 01 11 00

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SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.3 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit one electronic copy 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. The following documents shall be required for the Architects review at minimum. Failure to include any item listed shall be grounds for rejection.

1. Substitution Request Form: Use CSI Form 13.1A.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

   a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
   b. Coordination information, including a list of changes or revisions 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. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES
j. 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 date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. 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.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Requested substitution will not adversely affect Contractor's construction schedule.
c. Requested substitution has received necessary approvals of authorities having jurisdiction, including Florida Product Approval number if applicable.
d. Requested substitution is compatible with other portions of the Work.
e. Requested substitution has been coordinated with other portions of the Work.
f. Requested substitution provides specified warranty.
g. If requested substitution involves more than one contractor, the contractor shall certify in writing that the 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.

B. Substitutions for Convenience: Not allowed

PART 3 - EXECUTION (Not Used)

CSI FORM 13.1A follows in section 012500 Appendix 'A'

END OF SECTION 012500

END OF SECTION

SECTION 013100 - PROJECT MANAGEMENT AND COORDI

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. RFIs.
4. Digital project management procedures.
5. Project meetings.

B. Related Requirements:

1. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
2. Section 019113 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

1.2 INFORMATIONAL SUBMITTALS

A. 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, telephone number, and email address 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.

1.3 GENERAL COORDINATION PROCEDURES

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 to ensure maximum performance and accessibility for required maintenance, service, and repair.

3. Make adequate provisions to accommodate items scheduled for later installation.

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities 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. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

1.4 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on 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 dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling[, raised access floor,] and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.

3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.

C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format:

   a. Same digital data software program, version, and operating system as original Drawings.
   b. DWG,DXF, Version,operating in Microsoft Windows operating system.

2. File Submittal Format: Submit or post coordination drawing files usingformat same as file preparation format,PDF format].
3. BIM File Incorporation: [Develop and incorporate] [Construction Manager will incorporate Contractor's] coordination drawing files into BIM established for Project.
4. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.

   a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
   b. Digital Data Software Program: Drawings are available in <Insert name and version of digital data software program and operating system>.

1.5 Contractor shall execute a data licensing agreement in the form of AIA Document C106 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
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 information or interpretation and the following:

1. Owner name.
2. Owner's Project number.
3. Name of Architect[and Construction Manager].
4. Architect's Project number.
5. Date.
6. Name of Contractor.
7. RFI number, numbered sequentially.
8. RFI subject.
9. Specification Section number and title and related paragraphs, as appropriate.
10. Drawing number and detail references, as appropriate.
11. Field dimensions and conditions, as appropriate.
12. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
13. Contractor's signature.
14. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

C. RFI Forms: AIA Document G716Software-generated form with substantially the same content as indicated above, acceptable to Architect].

D. Architect' Action: Architectwill review each RFI, determine action required, and respond. Allow three and up to[seven business days for Architect's response for each RFI. RFIs received by Architec after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

    a. Requests for acceptance of submittals.
    b. Requests for acceptnce of substitutions.
    c. Requests for acceptance of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Requests for interpretation of Architect's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
3. Architect's 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 Section 012600 "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architec in writing withinfive days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit logmonthly and Software log with not less than the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect and Constractor
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's and Construction Manager's response was received.

F. On receipt of Architect'sand Construction Manager's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect and Construction Manager within three days if Contractor disagrees with response.

G. Web-Based Project Management Software Package: Provide, administer, and use Construction Manager's/ Contractor'sweb-based Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion.

1. Web-based Project management software includes, at a minimum, the following features:

a. Compilation of Project data, including Contractor, subcontractors, Architect, architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
c. Document workflow planning, allowing customization of workflow between project entities.
d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
e. Track status of each Project communication in real time, and log time and date when responses are provided.
f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
g. Processing and tracking of payment applications.
h. Processing and tracking of contract modifications.
i. Creating and distributing meeting minutes.
j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
k. Management of construction progress photographs.
l. Mobile device compatibility, including smartphones and tablets.
m. <Insert description of software feature>.

2. Provide up to [seven] <Insert number> web-based Project management software user licenses for use of Owner[, Owner's Commissioning Authority] Contractor, Architect, and Architect's consultants.
3. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.
4. 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. Autodesk Inc.Procore Technologies, Inc.

H. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.6 PROJECT MEETINGS

A. General:Contractor shall schedule and conduct meetings and conferences at Project site unless otherwise indicated.

B. Preconstruction Conference: Architect will schedule and conducta preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Attendees: Authorized representatives of Owner, Construction Manager/ Contractor,] Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. 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. Responsibilities and personnel assignments.
   b. Tentative construction schedule.
   c. Phasing.
   d. Critical work sequencing and long lead items.
   e. Designation of key personnel and their duties.
   f. Lines of communications.
   g. Use of web-based Project software.
   h. Procedures for processing field decisions and Change Orders.
   i. Procedures for RFIs.
   j. Procedures for testing and inspecting.

k. Procedures for processing Applications for Payment.
l. Distribution of the Contract Documents.
m. Submittal procedures.
n. Preparation of Record Documents.
o. Use of the premises and existing building.
p. Work restrictions.
q. Working hours.
r. Owner's occupancy requirements.
s. Responsibility for temporary facilities and controls.
t. Procedures for moisture and mold control.
u. Procedures for disruptions and shutdowns.
v. Construction waste management and recycling.
w. Parking availability.
x. Office, work, and storage areas.
y. Equipment deliveries and priorities.
z. First aid.
aa. Security.
bb. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for 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 Architect[, Construction Manager/ Contractor of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. Contract Documents.
b. Options.
c. Related RFIs.
d. Related Change Orders.
e. Deliveries.
f. Submittals.
g. Review of mockups.
h. Possible conflicts.
i. Compatibility requirements.
j. Time schedules.
k. Weather limitations.
l. Manufacturer's written instructions.
m. Warranty requirements.
n. Compatibility of materials.
o. Acceptability of substrates.
p. Temporary facilities and controls.

q. Space and access limitations.
r. Regulations of authorities having jurisdiction.
s. Testing and inspecting requirements.
t. Installation procedures.
u. Coordination with other work.
v. Required performance results.
w. Protection of adjacent work.
x. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
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: Construction Manager will conduct progress meetings atmonthly intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner, Owner's Commissioning Authority, Construction Manager, and Architect, 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 meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. 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.

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 use.

8) Temporary facilities and controls.
9) Progress cleaning.
10) Quality and work standards.
11) Status of correction of deficient items.
12) Field observations.
13) Status of RFIs.
14) Status of Proposal Requests.
15) Pending changes.
16) Status of Change Orders.
17) Pending claims and disputes.
18) Documentation of information for payment requests.

4. Minutes: Entity responsible, Construction Manager/ Contractor for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

   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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used) END OF SECTION 013100

3.1

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's Construction Schedule.
2. Construction schedule updating reports.
3. Daily construction reports.
4. Site condition reports.

1.2 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 Activity: An activity on the critical path that 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. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

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.

1.3 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file.
2. PDF file.
3. Two paper copies, of sufficient size to display entire period or schedule, as required.

B. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.

D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
3. Total Float Report: List of activities sorted in ascending order of total float.

E. Construction Schedule Updating Reports: **Submit with Applications for Payment.**

F. Daily Construction Reports: Submit at[monthly intervals.

G. Site Condition Reports: Submit at time of discovery of differing conditions.

1.4 COORDINATION

A. Coordinate Contractor's Construction Schedule with the schedule of valuessubmittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.5 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

B. 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.

C. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
4. Startup and Testing Time: Include no fewer than15 days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

D. 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. Phasing: Arrange list of activities on schedule by phase.
2. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
3. 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.

4. Other Constraints: <Insert constraints not indicated elsewhere>.

E. 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. Temporary enclosure and space conditioning.

F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and the Contract Time.

G. 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 final completion percentage for each activity.

H. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.

I. Distribution: Distribute copies of approved schedule to Architec 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.

1.6 CPM SCHEDULE REQUIREMENTS

A. Prepare network diagrams using AON (activity-on-node) format.

B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice to Proceed. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's Construction Schedule using a time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than60 days after date established for the Notice to Proceed.

    a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates.
2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
3. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule to coordinate with the Contract Time.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

    a. Preparation and processing of submittals.
    b. Mobilization and demobilization.
    c. Purchase of materials.
    d. Delivery.
    e. Fabrication.
    f. Utility interruptions.
    g. Installation.
    h. Work by Owner that may affect or be affected by Contractor's activities.
    i. Testing and inspection.
    j. Punch list and final completion.
    k. Activities occurring following final completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.

4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

    a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall Project schedule.

F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Main events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the schedule of values).

G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

1.7 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Testing and inspection.
8. Accidents.

9. Meetings and significant decisions.
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Equipment or system tests and startups.
16. Partial completions and occupancies.
17. Substantial Completions authorized.

B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013200

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SECTION 013220

WEB-BASED PROJECT INFORMATION MANAGEMENT

GENERAL

SUMMARY

The section includes Requirements for web-based project information management.

a. The system shall be provided by the Owner and accessible to all team members including but not limited to the owner, user, agents, designer, builder, subcontractors, and their suppliers.
b. The information shall be managed by a designated Owner project information manager responsible for collecting, organizing, conducting QA and posting all project documentation for team use,
c. The information managed is sourced from all aspects of the project including programming documents, design, BIM models, data, schedules, BIM tools, equipment lists, program files, invoices, changes, ASIs, financials, warranty, commissioning, close-out, as-builts, COBIE data, training videos, progress photos, time-stamped evidence, QA documentation, etc.
d. Each Consultant, Designer, and Contractor in direct contract with the Owner or the Owner's Representative will designate an individual responsible for providing or uploading information into the system.

Related sections:

a. The Contract Documents (design, specs, BIM) are complementary; what is called for by one is as binding as if called for by all.
b. It is the Contractor's responsibility for scheduling and coordinating the Work of subcontractors, suppliers, and other individuals or entities performing or furnishing any of Contractor's Work.
c. The following Sections are related to the Work described in this Section. This list of Related Sections is provided for convenience only and is not intended to excuse or otherwise diminish the duty of the Contractor to see that the completed Work complies accurately with the Contract Documents.
d. Section 01330 - Submittal Procedures.

REQUIREMENTS

The Project Team shall utilize MySmartPlans (MSP) (MySmartPlans is a registered trademark of Marathon Digital Services (MDS)). for submission of all data and documents (unless specified otherwise in this Section) throughout the duration of the project.

a. MSP is a web-based electronic media site hosted by MDS.
b. MSP will be made available to all project team personnel, subcontractor personnel, suppliers, consultants, and their team members.
c. MSP shall be the primary means of project information gathering, organization, storage, availability, sustainment, display, and recording.
d. A designated Project Information Manager (PIM) is required to help "library" and QC, QA, and QI documents from all external systems and available to the MSP dashboard.

User access limitations:
The Designated owner's representative will control the access to MSP by allowing access and assigning user profiles to accepted personnel. User profiles will define levels of access into the system; determine assigned function-based authorizations and user privileges. Subcontractors and suppliers will be given access to MSP by and through the Prime Contractor. Entry of information exchanged and transferred between the Contractor and its subcontractors and suppliers on MSP shall be designated by the Contractor.

Ownership and Stewardship of data:
Data entered in a collaborative mode (entered with the intent to share as determined by permissions and workflows within the MSP system) by the Owner, Engineer, and the Contractor will be jointly owned. The owner's designated agent will be responsible for stewardship of the information no matter where the information comes from or is changed as the project proceeds.

Automated system notification and audit log tracks:
Review comments made (or lack thereof) by the Owner on Contractor submitted documentation shall not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for managing, tracking, and documenting the Work to comply with the requirements of the Contract Documents. Owner's acceptance via automated system notifications or audit logs extends only to the face value of the submitted documentation and does not constitute validation of the Contractor's submitted information.

Computer Requirements:
The Contractor shall use computer hardware and software that meets the requirements of the MSP system as recommended by MDS to access and utilize MSP. As recommendations are modified by MSP, the Contractor will upgrade their system(s) to meet or exceed the recommendations. Upgrading of the Contractor's computer systems will not be justification for a cost or time modification to the Contract.

The Contractor shall ensure that connectivity to the MSP system is accomplished through cable or wireless communications systems. The minimum bandwidth requirements for using the system is 128kb/s. It is recommended a faster connection be used when uploading pictures and files into the system.

MSP supports the current and prior two major versions of Chrome, Mozilla Firefox, Microsoft Internet Explorer, and Apple Safari on a rolling basis.

Each time a new version of one of these browsers is released, MSP will begin supporting the update and stop supporting the fourth-oldest version.

Contractor (includes designer) responsibility:
The Contractor shall be responsible for the validity of their information placed in MSP and for the abilities of their personnel.

Accepted users shall be knowledgeable in the use of computers, including Internet Browsers, email programs, cad drawing applications, and Adobe Portable Document Format (PDF) document distribution program.

The Contractor shall utilize the existing forms in MSP to the maximum extent possible. If a form does not exist in MSP the Contractor must include a form of their own or provide by the Engineer as an attachment to a submittal.

Adobe PDF documents will be created through electronic conversion rather than optically scanned whenever possible. The Contractor is responsible for the training of their personnel in the use of MSP (outside what is provided by the Owner) and the other programs indicated above as needed.

Connectivity problems:
Provide a list of Contractor's key MSP personnel for the Owner's representative acceptance. Owner's rep is responsible for adding and removing users from the system. The Owner's rep reserves the right to perform a security check on all potential users. The Owner's rep may allow other personnel and subcontractors to be added to MSP.

SUBMITTALS

Preconstruction Submittals List of Contractor's key MSP personnel. Include descriptions of key personnel's roles and responsibilities for this project. The contractor should also identify their organization's administrator on the list.

PRODUCTS

DESCRIPTION

MSP project management application (no equal) Provided by MDS.

EXECUTION

MSP UTILIZATION

MSP shall be utilized in connection with all document and information management required by these Contract Documents.

SUBMITTALS

Shop drawings:

a. Shop drawing and design data documents shall be submitted as PDF attachments to the MSP submittal workflow process and form. Examples of shop drawings include, but are not limited to:
   (1) Standard manufacturer installation drawings.
   (2) Drawings prepared to illustrate portions of the work designed or developed by the Contractor.
   (3) Steel fabrication, piece, and erection drawings.
b. Hard copy submittals may be allowed if approved by the Engineer on a case-by-case basis.
   (1) Hard copy submittals shall be handled following procedures for Samples defined below.

PRODUCT DATA

Product catalog data and manufacturer's instructions shall be submitted as PDF attachments to the MSP submittal workflow process and form. Examples of product data include, but are not limited to:

a. Manufacturer's printed literature.

b. Preprinted product specification data and installation instructions.

SAMPLES

Sample submittals shall be physically submitted as specified in Section 01330. Contractor shall enter submittal data information into MSP with a copy of the submittal form(s) attached to the sample. Examples of samples include, but are not limited to:

a. Product finishes and color selection samples.
b. Product finishes and color verification samples.
c. Finish/color boards.
d. Physical samples of materials.

ADMINISTRATIVE SUBMITTALS

All correspondence and pre-construction submittals shall be submitted using MSP. Examples of administrative submittals include, but are not limited to:

a. Permits.
b. Requests for substitutions (RFS).
c. List of contact personnel.
d. Requests for Information (RFI).

Network Analysis Schedules and associated reports and updates. Each schedule submittal specified in these Contract Documents shall be submitted as a native backed-up file (.PRX or .STX) of the scheduling program being used. The schedule shall also be posted as a PDF file in the format specified in these Contract Documents.

Plans for safety, demolition, environmental protection, and similar activities.

Quality Control Plan(s), Testing Plan and Log, Quality Control Reports, Production Reports, Quality Control Specialist Reports, Preparatory Phase Checklist, Initial Phase Checklist, Field Test reports, Summary reports, Rework Items List, etc.

Meeting minutes for quality control meetings, progress meetings, pre-installation meetings, etc.

Any general correspondence submitted.

COMPLIANCE SUBMITTALS

Test reports, certificates, and manufacture field report submittals shall be submitted on MSP as PDF attachments. Examples of compliance submittals include, but are not limited to:

a. Inspection requests:
   (1) When a portion of Work is ready for inspection and prior to covering up the Work (for example, a concrete pour that has water stop, rebar and embeds placed prior to pouring the concrete), inspection requests shall be submitted via MSP and approved via MSP.
   (2) Reports associated with this element of the Work will be submitted via MSP and associated with the inspection request.
b. Field test reports.
c. Quality Control certifications.
d. Manufacturers' documentation and certifications for the quality of products and materials provided.

RECORD AND CLOSEOUT SUBMITTALS

Operation and maintenance data and closeout submittals shall be submitted on MSP as PDF documents during the approval and review stage as specified, with an actual set of documents submitted for final. Examples of record submittals include, but are not limited to:

a. Operation and Maintenance Manuals: final documents shall be submitted as specified.
b. Extra materials, spare stock, etc.: submittal forms shall indicate when actual materials are submitted.

FINANCIAL SUBMITTALS

Schedule of Value, Pay Requests, and Change Request Proposals shall be submitted on MSP. Supporting material for Pay Requests and Change Requests shall be submitted on MSP as PDF attachments. Examples of compliance submittals include, but are not limited to:

a. Contractor's Schedule of Values.
b. Contractor's Monthly Progress Payment Requests.
c. Contract Change proposals requested by the Owner.

END OF SECTION

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Concealed Work photographs.
3. Periodic construction photographs.
4. Final completion construction photographs.

B. Related Requirements:

1. Section 017700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
2. Section 024119 "Selective Demolition" for photographic documentation before selective demolition operations commence.

1.2 INFORMATIONAL 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. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

B. Digital Photographs: Submit image files within three days of taking photographs.

1. Submit photosby uploading to web-based Project management software site. Include copy of key plan indicating each photograph's location and direction.
2. Identification: Provide the following information with each image description [in file metadata tag] [in web-based Project management software site]:

a. Name of Project.
b. Name and contact information for photographer.
c. Name of Architect and Construction Manager/ Contractor.
d. Date photograph was taken.
e. Description of location, vantage point, and direction.
f. Unique sequential identifier keyed to accompanying key plan.

C. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of12 megapixels, and at an image resolution of not less than3200 by 2400 pixels Use flash in low light levels or backlit conditions.

D. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

E. Metadata: Record accurate date and time [and GPS location data]from camera.

F. File Names: Name media files withdate and Project area and sequential numbering suffix.

G. General: Take photographs with maximum depth of field and in focus.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.
2. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points,Take20 photographs to show existing conditions adjacent to property before starting the Work.
3. Take 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

H. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work, including, but not limited to, the following:

1. Underground utilities.
2. Underslab services.
3. Piping.
4. Electrical conduit.
5. Waterproofing and weather-resistant barriers.

I. Periodic Construction Photographs: Take minimum of20 photographsweekly. Select vantage points to show status of construction and progress since last photographs were taken.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect'sresponsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.3 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and Construction Managerand additional time for handling and reviewing submittals required by those corrections.

1.4 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:

1. Project name.
2. Date.
3. Name of Architect.
4. Name of Construction Manager.
5. Name of Contractor.
6. Name of firm or entity that prepared submittal.
7. Names of subcontractor, manufacturer, and supplier.
8. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.

9. Category and type of submittal.
10. Submittal purpose and description.
11. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
12. Drawing number and detail references, as appropriate.
13. Indication of full or partial submittal.
14. Location(s) where product is to be installed, as appropriate.
15. Other necessary identification.
16. Remarks.
17. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect\ and Construction Manager\ on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

E. Submittals for Utilizing Web-Based Project Management Software: Prepare submittals as PDF files or other format indicated by Project management software.

1.5 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Email: Prepare submittals as PDF package and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.
2. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project management software website. Enter required data in web-based software site to fully identify submittal.

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. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on\Architect'\ 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 resubmittals.

1. Initial Review: Allow\15\ days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. \Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Resubmittal Review: Allow 15 days for review of each resubmittal.

D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.6 SUBMITTAL REQUIREMENTS

A. 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 published data are unsuitable 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 catalog cuts.
    b. Manufacturer's product specifications.
    c. Color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

    a. Wiring diagrams that show factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.

d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before Shop Drawings, and before or concurrent with Samples.

B. 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 unless submittal based on Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identification of products.
b. Schedules.
c. Compliance with specified standards.
d. Notation of coordination requirements.
e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
g. Seal and signature of professional engineer if specified.

2.

C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.

1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
2. Identification: Permanently attach label on unexposed side of Samples that includes the following:

a. Project name and submittal number.
b. Generic description of Sample.
c. Product name and name of manufacturer.
d. Sample source.
e. Number and title of applicable Specification Section.
f. Specification paragraph number and generic name of each item.

3. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
4. 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 that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.

b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. 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 [one] <Insert number> full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect[, through Construction Manager,] will return submittal with options selected.

6. 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 [three] <Insert number> sets of Samples. Architect[and Construction Manager] will retain [two] <Insert number> Sample sets; remainder will be returned.[Mark up and retain one returned Sample set as a project record Sample.]

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] <Insert number> sets of paired units that show approximate limits of variations.

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, contact information of architects and owners, and other information specified.

E. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

F. Certificates:

1. Certificates and Certifications Submittals: Submit a 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. Provide a notarized signature where indicated.
2. Installer Certificates: Submit 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.
3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualificatio Record on AWS forms. Include names of firms and personnel certified.

G. Test and Research Reports:

1. Compatibility Test Reports: Submit 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 substrate preparation and primers required.
2. Field Test Reports: Submit written reports 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.
3. Material Test Reports: Submit 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.
4. Product Test Reports: Submit written reports indicating that 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.

1.7 DELEGATED DESIGN SERVICES

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 insufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated Design Services Certification: Certification shall be by placing the signature and seal of a Licensed Professional Engineer currently Registered in the State of Florida. In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file paper copies of certificate, 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.

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.

1.8 CONTRACTOR'S REVIEW

A. Action Submittals and Informational Submittals: 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 Architect[and Construction Manager].

B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp or indication in web-based Project management software. Include 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.

1. **Architect will not review submittals received from Contractor that do not have Contractor's review and approval.**

1.9 ARCHITECT'SREVIEW

A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required and return.

1. PDF Submittals: Architec will indicate, via markup on each submittal, the appropriate action, as follows:

a.

a. Reviewed

b. Rejected

c. Furnish as Corrected

d. Revise and Resubmit
e. Submit Specified Item.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has been reviewed byArchitect

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013516 - ALTERATION PROJECT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes special procedures for alteration work.

1.2 DEFINITIONS

A. Alteration Work: This term includes remodeling, renovation, repair, and maintenance work performed within existing spaces or on existing surfaces as part of the Project.

B. Consolidate: To strengthen loose or deteriorated materials in place.

C. Design Reference Sample: A sample that represents the Architect's prebid selection of work to be matched; it may be existing work or work specially produced for the Project.

D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.

F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.

G. Repair: To correct damage and defects, retaining existing materials, features, and finishes. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.

H. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.

I. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.

J. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.

K. Retain: To keep an element or detail secure and intact.

L. Strip: To remove existing finish down to base material unless otherwise indicated.

1.3 PROJECT MEETINGS FOR ALTERATION WORK

A. Coordination Meetings: Conduct coordination meetings specifically for alteration work at **weekly**intervals. Coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

1. Agenda: Review and correct or approve minutes of previous coordination meeting. Review other items of significance that could affect progress of alteration work. Include topics for discussion as appropriate to status of Project.
2. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.4 MATERIALS OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered or uncovered during the Work, regardless of whether they were previously documented, remain Owner's property.

1.5 STORAGE AND HANDLING OF SALVAGED MATERIALS

A. Salvaged Materials:

1. Clean loose dirt and debris from salvaged items unless more extensive cleaning is indicated.
2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
3. Store items in a secure area until delivery to Owner.

B. Transport items to Owner's storage area designated by OwnerSalvaged Materials for Reinstallation:

1. Repair and clean items for reuse as indicated.
2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.

C. Existing Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after alteration and other construction work in the vicinity is complete.

D. Storage: Catalog and store items within a weathertight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures.

1. Identify each item for reinstallation with a nonpermanent mark to document its original location. Indicate original locations on plans, elevations, sections, or photographs by annotating the identifying marks.
2. Secure stored materials to protect from theft.
3. Control humidity so that it does not exceed 85 percent. Maintain temperatures 5 deg F or more above the dew point.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION

3.1 GENERAL ALTERATION WORK

A. Record existing work before each procedure (preconstruction), and record progress during the work. Use digital preconstruction documentation **photographs or video recordingwith verbal commentarys** . Comply with requirements in Section 013233 "Photographic Documentation."

B. Perform surveys of Project site as the Work progresses to detect hazards resulting from alterations.

C. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.

1. Do not proceed with the work in question until directed by Architect.

END OF SECTION 013516

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SECTION 014000 - QUALITY REQUIREMENTS/ FLORIDA PRODUCT APPROVAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control and compliance with Florida Product Evaluation and Approval.

B. Testing and inspection 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 quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. FLORIDA PRODUCT APPROVAL AND EVALUATION

1. REFERENCES

a. Florida Statute 553.842
b. Florida Administrative Code 9B-72
c. Definition: Product evaluation and approval system that applies statewide to concurrent with the Florida Building Code.
d. RESPONSIBILITY: The Contractor is responsible for providing products approved by the State of Florida with approval numbers. Do not use products that do not have a Florida approval number.
e. SUBMITTAL: Submit a copy of the approved product schedule, (attached at the end of this section), to the Architect within thirty (30) days after project has been awarded. In addition to State requirements comply with the requirements of the local jurisdiction of the project.
f. Submit the following product approval specification sheet, or local jurisdiction form to obtain building permits.

D. CATEGORIES

1. General: Products, methods, or systems of construction, used in the exterior envelope of a building must be approved by the Building Department. The products covered are those products, methods or systems that affect the structural integrity of the building envelope, including but not limited to the following categories.

    a. Panel Walls.
    b. Exterior Doors
    c. Roofing Products.
    d. Skylights
    e. Windows
    f. Shutters
    g. Structural Components
    h. New and Innovative Building Envelope Products.

E. If the Contractor fails to comply with this requirement, non-complying components shall be removed and replaced with components that do comply at no expense to the Owner.

1.3 DELEGATED DESIGN SERVICES

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 Architect.

B. Delegated Design Services Statement: Submit a statement signed and sealed by the responsible design professional, Registered in the State of Florida, , 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.

1.4 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is 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 Architect for a decision before proceeding.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: 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 Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's **authorities' having jurisdiction**reference during normal working hours.

1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

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SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Accepted": When used to convey Architect's action on Contractor's submittals, applications, and requests, "accepted" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. [Abbreviations and acronyms not included in this list shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."]The information in this list is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; (See FGIA).
3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
7. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
8. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
9. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
10. AF&PA - American Forest & Paper Association; www.afandpa.org.
11. AGA - American Gas Association; www.aga.org.
12. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
13. AI - Asphalt Institute; www.asphaltinstitute.org.
14. AIA - American Institute of Architects (The); www.aia.org.
15. AISC - American Institute of Steel Construction; www.aisc.org.
16. AISI - American Iron and Steel Institute; www.steel.org.

17. AITC - American Institute of Timber Construction; www.plib.org.
18. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
19. ANSI - American National Standards Institute; www.ansi.org.
20. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
21. APA - APA - The Engineered Wood Association; www.apawood.org.
22. APA - Architectural Precast Association; www.archprecast.org.
23. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
24. ARI - American Refrigeration Institute; (See AHRI).
25. ASCE - American Society of Civil Engineers; www.asce.org.
26. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
27. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
28. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
29. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
30. ASSP - American Society of Safety Professionals (The); www.assp.org.
31. ASTM - ASTM International; www.astm.org.
32. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
33. AVIXA - Audiovisual and Integrated Experience Association; (Formerly: Infocomm International); www.avixa.org.
34. AWI - Architectural Woodwork Institute; www.awinet.org.
35. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
36. AWPA - American Wood Protection Association; www.awpa.com.
37. AWS - American Welding Society; www.aws.org.
38. AWWA - American Water Works Association; www.awwa.org.
39. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
40. BIA - Brick Industry Association (The); www.gobrick.com.
41. BICSI - BICSI, Inc.; www.bicsi.org.
42. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
43. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
44. CE - Conformite Europeenne; http://ec.europa.eu/growth/single-market/ce-marking.
45. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
46. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
47. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
48. CSI - Construction Specifications Institute (The); www.csiresources.org.
49. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
50. DHI - Door and Hardware Institute; www.dhi.org.
51. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
52. ETL - Intertek (See Intertek); www.intertek.com.
53. FGIA - Fenestration and Glazing Industry Alliance; https://fgiaonline.org.
54. FM Approvals - FM Approvals LLC; www.fmapprovals.com.
55. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.

56. FRSA - Florida Roofing, Sheet Metal Contractors Association, Inc.; www.floridaroof.com.
57. GA - Gypsum Association; www.gypsum.org.
58. GANA - Glass Association of North America; (See NGA).
59. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
60. HPVA - Hardwood Plywood & Veneer Association; (See DHA).
61. ICC - International Code Council; www.iccsafe.org.
62. LPI - Lightning Protection Institute; www.lightning.org.
63. MPI - Master Painters Institute; www.paintinfo.com.
64. NCMA - National Concrete Masonry Association; www.ncma.org.
65. NECA - National Electrical Contractors Association; www.necanet.org.
66. NEMA - National Electrical Manufacturers Association; www.nema.org.
67. NFPA - National Fire Protection Association; www.nfpa.org.
68. NGA - National Glass Association (The); (Formerly: Glass Association of North America); www.glass.org.
69. NRCA - National Roofing Contractors Association; www.nrca.net.
70. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
71. PDI - Plumbing & Drainage Institute; www.pdionline.org.
72. SDI - Steel Deck Institute; www.sdi.org.
73. SDI - Steel Door Institute; www.steeldoor.org.
74. SJI - Steel Joist Institute; www.steeljoist.org.
75. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
76. SPRI - Single Ply Roofing Industry; www.spri.org.
77. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
78. TMS - The Masonry Society; www.masonrysociety.org.
79. UL - Underwriters Laboratories Inc.; www.ul.com.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. ICC - International Code Council; www.iccsafe.org.
2. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.
3. FBC - Florida Building Code

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
3. DOD - Department of Defense; www.quicksearch.dla.mil.
4. DOE - Department of Energy; www.energy.gov.
5. EPA - Environmental Protection Agency; www.epa.gov.
6. FAA - Federal Aviation Administration; www.faa.gov.
7. OSHA - Occupational Safety & Health Administration; www.osha.gov.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

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SECTION 014339 - MOCKUPS

PART 1 - GENERAL

1.1 DEFINITIONS

A. Integrated Exterior Mockups: Mockups of the exterior envelope constructed on-site as **freestanding temporary built elements**, consisting of multiple products, assemblies, and subassemblies.

B. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes; doors; windows; millwork; casework; specialties; furnishings and equipment; and lighting as indicated.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Construction Manager, and Architect, testing and inspecting agency representative, and installers of major systems whose Work is included in integrated exteriorand room mockups.
2. Review coordination of equipment and furnishings provided by the Owner for room mockups.
3. Review locations and extent of mockups.
4. Review testing procedures to be performed on mockups.
5. Review and finalize schedule for mockups, and verify availability of materials, personnel, equipment, and facilities needed to complete mockups [and testing] and maintain schedule for the Work.

1.3 ACTION SUBMITTALS

A. Shop Drawings: For integrated exteriorand room mockups.

B. Delegated Design Submittal: For temporar] [ry structural supports for mockups not attached to building structure, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Fabrication: Before fabricating or installing portions of the Work requiring mockups, build mockups for each form of construction and finish required. Use materials and installation methods as required for the Work.

1. Build mockups of size indicated.
2. Build mockups in location indicated or, if not indicated, as directed by Architect or Construction Manager .

3. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
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.

7. Notify Architect and Construction Manager seven days in advance of the dates and times when mockups will be constructed.

D. Approval: Obtain Architect's acceptance of mockups before starting fabrication or construction of corresponding Work.

1. Unless otherwise indicated, accepted mockups establish the standard by which the Work will be judged.
2. Acceptance of mockups does not constitute acceptance of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.4 COORDINATION

A. Coordinate schedule for construction of mockups, so construction, testing, and review of mockups do not impact Project schedule.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design support structure for free-standing mockups.

B. Structural Performance:
1. Wind Loads: As indicated on Drawings.

C. Mockup Testing Performance Requirements: Perform tests using design pressures and performance criteria indicated for assemblies and products that are specified in other Sections and incorporated into**integrated exterior** mockups.

D. The Work of integrated exterior mockups includes, but is not limited to, the following:
1. Masonry veneer.
2. Cold-formed metal framing and sheathing.
3. Air and weather barriers.
4. Thermal insulation.
5. Through-wall flashing.
6. Flashing and sheet metal trim.
7. Joint sealants.
8. Metal wall panels.

E. Photographic Documentation: Document construction of integrated exterior mockups with photographs in accordance with Section 013233 "Photographic Documentation." Provide photographs showing details of interface of different materials and assemblies.

1. Document testing procedures, including water leakage and other deficiencies. Photograph modifications to component interfaces intended to correct deficiencies.

F. Provide and document modifications to construction details and interfaces between components and systems required to properly sequence the Work, or to pass performance testing requirements. Obtain Architect's acceptance for modifications.

G. Retain \ mockups constructed in place. Incorporate fully into the Work.

2.2 ROOM MOCKUPS

A. Build room mockupsas indicated on Drawings to evaluate constructability, demonstrate the coordination of trades and sequencing of Work, and to demonstrate aesthetic requirements. Include each visible finish, component, and equipment item within room mockups; include operable lighting.

B. Provide room mockups where directed by the Architect.
1. Doors and frames.
2. Access doors and frames.
3. Metal framing.
4. Gypsum board.
5. Painting.

PART 3 - EXECUTION

END OF SECTION 014339

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SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.2 USE CHARGES

A. Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, **Owner's construction forces,** Architect, testing agencies, and authorities having jurisdiction.

B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use [**with metering**] [**without metering and without payment of use charges**]. Provide connections and extensions of services [**and metering**] as required for construction operations.

C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use [**with metering**] [**without metering and without payment of use charges**]. Provide connections and extensions of services [**and metering**] as required for construction operations.

1.3 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to 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.

PART 2 - PRODUCTS

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. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 MOISTURE AND MOLD CONTROL

A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.

B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard and replace stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

3.3 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.

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.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. 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. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

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SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. 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; and comparable products.

1) Section 012500 "Substitution Procedures" for requests for substitutions.
2) |Section 0140000 " Quality Requirements/ Florida Product approval

1.2 DEFINITIONS

A. Products: Items obtained 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. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, 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. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.

1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Provide Florida Product Approval Number where applicable.

C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.

D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:

1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.

E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 013300 "Submittal Procedures."

F. Substitution: Refer to Section 012500 "Substitution Procedures" for definition and limitations on substitutions.

1.3 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options. It shall be the Contractor's responsibility to confirm that products submitted shall have Florida Product approval Numbers where applicable.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

1.5 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: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, 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. Architect reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following."

2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

   a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following."

3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience may be consideredunless otherwise indicated.

   a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."

4. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

   a. For acceptance of products by unnamed manufacturers, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience.

C. Visual Matching Specification: Where Specifications require the phrase "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

   1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or a similar phrase, select a product that complies with requirements. **Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.**

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with the following requirements:

1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
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.

B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation, as specified in Section 013300 "Submittal Procedures."

1. Form of Accceptance of Submittal: As specified in Section 013300 "Submittal Procedures."

C. Submittal Requirements, Two-Step Process: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

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SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

PART 2 - PRODUCTS

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 sitework, excavation or demolition, investigate and verify the existence and location of underground utilities, **mechanical and electrical systems,** and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.
2. 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.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

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, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
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 **local utility** 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, submit a request for information to Architect **through Construction Manager**in accordance with requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks and existing conditions. If discrepancies are discovered, notify Architect and Construction Manager promptly.

B. Engage a land surveyorand/or professional engineerexperienced in laying out the Work, using the following accepted surveying practices:

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.

6. Notify Architect and Construction Manager when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect[and Construction Manager].

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect or Construction Manager. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to and Construction Manager before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

3.5 INSTALLATION

A. 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. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
3. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces, unless otherwise indicated on Drawings.

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 satisfactory results as determined by Architect. 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 of type expected for Project.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.

F. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

G. 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 with manufacturer.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
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.

H. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as determined by Architect. Fit exposed connections together to form hairline joints.

3.6 CUTTING AND PATCHING

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of Work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements in Section 011000 "Summary."

F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as practicable, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 COORDINATION OF OWNER'S PORTION OF THE WORK

A. Site Access: Provide access to Project site for Owner's construction personnel[and Owner's separate contractors].

1. Provide temporary facilities required for Owner-furnished, Contractor-installed products.
2. Refer to Section 011000 "Summary" for other requirements for Owner-furnished, Contractor-installed products.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel[and Owner's separate contractors].

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.

3.8 PROGRESS CLEANING

A. Clean Project site and work areas daily, including common areas. 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: 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 Section 017419 "Construction Waste Management and Disposal."

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 ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in individual specification sections..

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 Section 014000 "Quality Requirements."

3.10 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. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

C. Comply with manufacturer's written instructions for temperature and relative humidity.

3.11 CORRECTION OF THE WORK

A. Repair or remove and replace damaged, defective, or nonconforming Work. 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. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.

C. Restore permanent facilities used during construction to their specified condition.

D. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

E. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

F. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

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SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous demolition and construction waste.
2. Disposing of nonhazardousdemolition and construction waste.

1.2 DEFINITIONS

A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.

C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner’s property.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 30 days of date established forthe Notice to Proceed.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

   1. Clean salvaged items.

   2. Pulverize concrete to maximum [1-1/2-inch] [4-inch] size.

3.3 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

   1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

END OF SECTION

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.

B. Related Requirements:

1. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
2. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
3. Section 017900 "Demonstration and Training" for requirements to train the Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of cleaning agent.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest-control inspection.

1.4 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the cost value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated bythe Owner. Label with manufacturer's name and model number.
5. Submit testing, adjusting, and balancing records.
6. Submit sustainable design submittals not previously submitted.
7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 14 consecutive calendar days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in utility services.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements.
10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 14 consecutive calendar days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect 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 Architect, that must be completed or corrected before certificate will be issued.

1.5 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:

1. Submit a final Application for Payment in accordance with Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. FinalCompletion: Submit a written request for final completion to determine acceptance a minimum of 14 consecutive calendar days prior to date the Work will be completed and ready for final completion and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect 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.

1.6 LIST OF INCOMPLETE ITEMS

A. Organization of List: 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, listed by room or space number.
2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.

e. Page number.

4. Contractor shalls submit list of incomplete items in one of the following formats:

a. MS Excel Electronic File: Architect will return annotated file.
b. PDF Electronic File: Architec will return annotated file.
c. Web-Based Project Software Upload: Utilize software feature for creating and updating list of incomplete items (punch list).

1.7 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty. All warranties shall commence on the date of Substantial Completion this requirement suoercedes any other requirements tat may be included in the specification.

B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

C. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

D. Warranties in Paper Form:

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.

E. 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.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. Perform 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 designated portion of Project:

a. Clean Project site of rubbish, waste material, litter, and other foreign substances.
b. 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.
c. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
d. Clean flooring, removing debris, dirt, and staining; clean according to manufacturer's recommendations.
e. Vacuum and mop concrete.
f. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
g. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
h. Remove labels that are not permanent.
i. Wipe surfaces of mechanical and electrical equipment[, elevator equipment,] and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
j. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
k. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
l. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.

1) Clean HVAC system in compliance with NADCA ACR, and the MechanicalSpecifications includedin this document

m. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
n. Clean strainers.
o. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

D. Construction Waste Disposal: Comply with waste-disposal requirements in Section 017419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations required by Section 017300 "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory manuals.
2. Emergency manuals.
3. Systems and equipment operation manuals.
4. Systems and equipment maintenance manuals.
5. Product maintenance manuals.

1.2 CLOSEOUT SUBMITTALS

A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect[and Commissioning Authority] will comment on whether content of operation and maintenance submittals is acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record specifications.
3. Record Product Data.

B. Related Requirements:

1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.2 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit [one] <Insert number> set(s) of marked-up record prints.
2. Number of Copies: Submit copies of Record Drawings as follows:

a. Initial Submittal:

1) Submit [one] <Insert number> paper-copy set(s) of marked-up record prints.
2) Submit PDF electronic files of scanned record prints and [one] <Insert number> set(s) of file prints.
3) Submit Record Digital Data Files and [one] <Insert number> set(s) of plots.
4) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

b. Final Submittal:

1) Submit [three] <Insert number> paper-copy set(s) of marked-up record prints.
2) Submit PDF electronic files of scanned Record Prints and [three] <Insert number> set(s) of file prints.
3) Print each drawing, whether or not changes and additional information were recorded.

c. Final Submittal:

1) Submit [one] <Insert number> paper-copy set(s) of marked-up record prints.
2) Submit Record Digital Data Files and [three] <Insert number> set(s) of Record Digital Data File plots.
3) Plot each drawing file, whether or not changes and additional information were recorded.

B. Record Specifications: Submit [annotated PDF electronic files] [and] <Insert number> [paper copies] of Project's Specifications, including addenda and Contract modifications.

C. Record Product Data: Submit [annotated PDF electronic files and directories] [and] <Insert number> [paper copies] of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

1.3 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

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 provide information for preparation of corresponding 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 acceptable drawing technique.
c. Record data as soon as possible after obtaining it.
d. Record and check the markup before enclosing concealed installations.
e. Cross-reference record prints to corresponding photographic documentation.

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.
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] [Work] Change Directive.
k. Changes made following Architect'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 and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at 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. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect[and Construction Manager]. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Same digital data software program, version, and operating system as for the original Contract Drawings.
2. Format: [DWG] [DXF] [DGN], Version <Insert designation>, [Microsoft Windows] [Apple Macintosh] operating system.
3. Format: Annotated PDF electronic file[with comment function enabled].
4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
5. Refer instances of uncertainty to Architect[through Construction Manager] for resolution.
6. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.

C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file[with comment function enabled].
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."

d. Name of Architect[and Construction Manager].
e. Name of Contractor.

1.4 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation, where installation varies from that indicated in Specifications, addenda, and Contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. Note related Change Orders[, Record Product Data,] and Record Drawings where applicable.

B. Format: Submit record specifications as [annotated PDF electronic file] [paper copy] [scanned PDF electronic file(s) of marked-up paper copy of Specifications].

1.5 RECORD PRODUCT DATA

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and revisions to Project Record Documents as they occur; do not wait until end of Project.

B. 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 Specifications,] and Record Drawings where applicable.

C. Format: Submit Record Product Data as [annotated PDF electronic file] [paper copy] [scanned PDF electronic file(s) of marked-up paper copy of Product Data].

1. Include Record Product Data directory organized by Specification Section number and title, electronically linked to each item of Record Product Data.

1.6 MAINTENANCE OF RECORD DOCUMENTS

A. Maintenance of Record Documents: Store Record Documents 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[and Construction Manager's] reference during normal working hours.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

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 have been reviewed and approved by Architect.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

1.2 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.3 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust controland, for noise control. Indicate proposed locations and construction of barriers.

B. Schedule of selective demolition activities, with starting and ending dates for each activity.

C. Predemolition photographs or video.

1.5 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

G. Arrange selective demolition schedule so as not to interfere with Owner's operations.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

C. Sustainable Design Requirements for Building Reuse:

1. Maintain existing building structure (including structural floor and roof decking) and envelope (exterior skin and framing, excluding window assemblies and nonstructural roofing material) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.
2. Maintain existing interior nonstructural elements (interior walls, doors, floor coverings, and ceiling systems) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.
3. Maintain the existing building facade where indicated to remain. Do not demolish such existing construction beyond indicated limits.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

B. Inventory and record the condition of items to be removed and salvaged.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Arrange to shut off utilities with utility companies. Coordinate with Owner and do not shut off utilities affecting occupied portions of the building.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.

3.3 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
4. Maintain fire watch during and for at least four hours after flame-cutting operations.
5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
6. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Reinstalled Items:

1. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition[and cleaned] and reinstalled in their original locations after selective demolition operations are complete.

3.5 CLEANING

A. Remove demolition waste materials from Project site **and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."**

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

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SECTION 03 3000 - CAST-IN-PLACE CONCRETE

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. SCOPE OF WORK

1. Provide all labor, materials, equipment and services necessary to complete all cast-in-place concrete work, including formwork, reinforcing steel and all related work as shown and specified, except as specifically excluded hereinafter.
2. In addition to construction of cast-in-place concrete work, the work includes the items listed below:
   a. Setting anchor bolts, frames, and other items indicated to be embedded in concrete
   b. Grouting of structural steel bearing on concrete
   c. Concrete curbs
   d. Dowels for masonry walls
   e. Concrete walks
   f. Concrete pavement
   g. Laboratory field testing services
3. Cooperate with affected personnel or contractors in setting and/or fastening sleeves, piping, inserts, conduits, hangers, ties and similar items in the forms, where such items are to be furnished and installed under other subdivisions of these specifications.

B. RELATED WORK NOT SPECIFIED UNDER THIS SUBDIVISION

1. Foundations and pads not shown on architectural, civil or structural drawings.
2. Furnishing steel frames and grating.
3. Furnishing miscellaneous steel shapes and plates embedded in concrete.
4. Furnishing anchor bolts for structural steel.
5. Furnishing piping and conduit embedded in concrete.

1.3 QUALITY ASSURANCE

A. APPLICABLE STANDARDS

1. Provide all materials and perform all work in accordance with the latest issue of ACI 301 "Standard Specifications for Structural Concrete A“ and the reference specifications listed therein.
2. The applicable provisions of the latest issue of the following ACI and CRSI Standards are made a part of these specifications. Where the provisions of any reference specification conflict with those of ACI 301, the more stringent provisions govern.

ACI NUMBER	TITLE
302.1R	Guide for Concrete Floor and Slab Construction
304.R	Guide for Measuring, Mixing, Transporting and Placing Concrete
304.2R	Placing concrete by pumping methods.

305R	Hot Weather Concreting
306R	Cold Weather Concreting
308	Standard Practice for Curing Concrete
309R	Guide for Consolidation of Concrete
315	Manual of Standard Practice for Detailing Reinforced Concrete Structures
318	Building code requirements for reinforced concrete
347	Recommended Practice for Concrete Formwork
70-56	Guide for Use of Epoxy Compounds with Concrete – Committee 503 Report
75-18	Concrete committee 503 report. Cold weather concreting.

CRSI NUMBER	TITLE
63	Recommended Practice for Placing Reinforcing Bars

1.4 SUBMITTALS

A. Submit, not less than 21 days prior to placing of concrete, the following proposed concrete mix design data:

1. Intended usage and location for each type
2. Mix design for each type
3. Cement content in pounds per cubic yard
4. Coarse and fine aggregate in pounds per cubic yard
5. Water-cement ratio by weight
6. Cement type and manufacturer
7. Slump range
8. Air content range
9. Admixture types and manufacturers
10. Percent of admixtures by weight
11. Strength test data required to establish mix design

B. Submit complete detail and placing shop drawings for all reinforcing steel including accessories that have been reviewed and stamped by the General Contractor.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

A. Portland Cement - ASTM C 150, Type I. Type III may be used where authorized by the Engineer.

B. Air-Entraining Admixtures - ASTM C 260, Darax AEA, W. R. Grace & Company, SIKA AER, SIKA, MB-AE90, Master Builders, Air Mix, Euclid Chemical Corp.

C. Water-Reducing Admixtures - ASTM C 494, Type D. WRDA-64, W.R. Grace & Company Plastiment, SIKA, Pozzolith N, Master Builders.

D. No accelerators, retarders or admixtures containing chlorides will be permitted.

E. Use fresh, clean and drinkable water for concrete.

F. For normal weight concrete use coarse and fine aggregate to conform to ASTM C33.

G. Super Plasticizer ASTM C494 Type F or G where authorized by the Engineer.

H. Fly-ash ASTM C618 Type C618. Maximum loss on ignition shall not exceed 3% by weight. The combined weight of fly-ash shall not exceed 20 percent of the total weight of cementitious material. The fly-ash present in blended cement conforming to ASTM C595 shall be included in the calculated percentage. Do not use for architectural concrete.

I. Ground granulated blast-furnish slag ASTM C989. the combined weight of GGBFS shall not exceed 50 percent of the total weight of cementitious material. Slag used in blended hydraulic cement confirming to ASTM C595 shall be included in the calculated percentage.

2.2 PROPORTIONING

A. Concrete Strength – See structural drawings for minimum concrete compressive strength at 28 days.

B. PROPERTIES

1. Provide concrete having the general properties specified for each class of concrete with the following tables to provide workability and consistency so concrete can be worked readily into forms and around reinforcement without segregation or bleeding, and to provide an average compressive strength adequate to meet acceptance requirements of ACI 301.

2.3 PRODUCTION OF CONCRETE

A. Concrete must be batched, mixed and transported in accordance with specifications for ready-mixed concrete ASTM C 94.

B. Concrete shall be batched to produce a slump of 4" plus/minus 1". Refer to 2.02B unless noted otherwise.

C. Provide at the site, delivery tickets for each batch of concrete showing the following:

1. Batch number, volume and date
2. Time of loading
3. Design 28-day compressive strength
4. Concrete type
5. Cement content in pounds per cubic yard
6. Water content in pounds per cubic yard
7. Admixtures in amount per cubic yard
8. Maximum amount of water that may be added at the job site.

D. Restrict the addition of mix water at the job site. Do not add water without the approval of the general contractor and do not exceed slump limitations or total allowable water to cement ratio. Use cold water from the truck tank and remix to achieve consistency. The reports shall indicate how much water was added at the job site. Note on delivery ticket amount of water added and name of person authorizing.

E. During hot weather, conform to the detailed recommendations of ACI 305.

F. When air temperature is between 85 and 90 degrees F., reduce mixing and delivery time to 75 minutes. When air temperature is higher than 90 degrees, reduce mixing and delivery time to 60 minutes.

G. Concrete should be deposited as nearly as practicable to its final position to avoid segregation of materials due to re-handling or flowing.

H. Concreting should be carried on at such a rate that the concrete is at all times plastic and flows readily into spaces between reinforcement.

I. The use of the following is prohibited:
   1. Partially hardened concrete
   2. Contaminated concrete
   3. Re-tempered concrete
   4. Concrete that has been re-mixed after it has taken its initial set.

J. After concreting has been started, it should be carried on as a continuous operation until placing of a panel or section, as determined by its boundaries or joints, is completed.

K. All concrete should be thoroughly consolidated by suitable means during placement and should be worked around reinforcement and embedded fixtures and into corners of forms.

2.4 PLACING CONCRETE

A. GENERAL
   1. Inner surfaces of conveying equipment must be free of hardened concrete and foreign materials.
   2. All reinforcing bars are to be tied in proper position prior to placing concrete.
   3. Provide sufficient time for inspection of all preparatory work before proceeding with the placing of concrete.
   4. Immediately prior to placing concrete, sprinkle semi-porous sub-grades sufficiently to eliminate suction and seal porous sub-grades, except where a vapor barrier is used.
   5. Deposit concrete in forms in horizontal layers continuously, no deeper than 18 inches. Horizontal cold joints will not be permitted. Fill forms completely using methods to ensure even distribution of aggregate around reinforcement and into corners of forms.
   6. When air temperature is between 85 and 90 degrees F, reduce mixing and delivery time to 75 minutes. When air temperature is higher than 90 degrees F, reduce mixing and delivery time to 60 minutes.
   7. Concrete shall have a wet cure time of 7 days minimum at 50 degrees minimum temperature.
   8. Concrete shall be deposited as nearly as practicable to its final position to avoid segregation of materials due to re-handling or flowing.
   9. Concreting shall be carried on at such a rate that the concrete is at all times plastic and flows readily into spaces between reinforcement.
   10. The following conditions are prohibited:
      a. Partially hardened concrete.
      b. Contaminated concrete.
      c. Re-tempered concrete.
      d. Concrete that has been re-mixed after it has taken its initial set.
   11. After concreting has been started, it shall be carried on as a continuous operation until placing or a panel or section, as determined by its boundaries or joints, is completed.

B. CONSOLIDATION
   1. Consolidate concrete by vibration in accordance with the detailed recommendations of ACI 309.

2. Internal vibrators must be used in beams, girders and framed slabs and along bulkheads or slabs-on-grade to thoroughly consolidate the concrete. Do not use grossly oversized equipment.

3. Do not use vibrators to transport concrete within forms.

C. FINISHING

1. Finish concrete slabs in accordance with the finishes and tolerances as specified in ACI 301, and the detailed recommendations in ACI 302. Confirm all finishes with Architect.

2. Dusting of slabs with cement or other materials to absorb excess bleed water is strictly prohibited.

ITEM	TOLERANCE CLASS	FINISH
Exterior Pavement	B	Broom or belt
Exterior Walks/Curbs	B	Fine broom
Interior Slabs	A	Troweled
Exterior Steps	A	Nonslip

3. For flat, very flat and super flat floors, "F" numbers are required for defining flatness and levelness. Refer to ACI 301.1R, Fig. 8.15.1.1, for minimum required "F" numbers for type of slab use.

D. NONSLIP FINISH

1. Give surface a dry shake application as specified in ACI 301 using crushed selected abrasive aggregate of aluminum oxide. The rate of application of blended mixture should not be less than 25 pounds per 100 square feet of surface.

2. Acceptable products are:

TYPE	MANUFACTURER
Grip-It	L&M Construction Chemicals
Frictex N.S.	Sonneborn
Nonslip	Euclid Chemical Co.
Emag 20	Lambert Corp.

2.5 REINFORCEMENT

A. GENERAL

1. Details of concrete reinforcement and accessories not covered herein or shown on drawings to be in accordance with ACI 315.

2. Reinforcement is to be secured in proper position and thoroughly clean of loose rust, scale, grease or other coatings.

B. REINFORCING MATERIALS

1. Unless otherwise indicated, for all reinforcing shown provide deformed bars conforming to ASTM A 615, or a 616 Grade 60.

2. Smooth dowels - ASTM A 615 and A 616, plain bars having a minimum yield strength of 60,000 psi.

3. Welded wire fabric - ASTM A 185 plain wire fabric in flat sheets.

4. Plain wire to conform to ASTM A 82.

5. Accessories to conform to ACI 315.

6. Where reinforcing rods are used as supports, use rods no lighter than No. 5.

7. Where concrete surfaces are exposed, make those portions of all accessories in contact with the concrete surface or within 1/2 inch thereof, of plastic or stainless steel.
8. Reinforcing steel should be free of kinks and non-shop bends. Field bends should be only as approved by the architect.

C. FIBROUS REINFORCING (Synthetic)

1. Reinforcing fibers to be virgin 100% polypropylene fibers, per ASTM C1116, specifically manufactured for use in concrete, containing no reprocessed olefin materials, with the following minimum physical characteristics:
   a. specific gravity: 0.91
   b. modulus of elasticity: 500-700 KSI
   c. tensile strength: 70-110 KSI
   d. fiber length: multi-design gradation, 3/4" maximum.
2. Reinforcing fibers to be supplied by the following approved manufacturers:
   a. "FIBERSTRAND 100", Euclid Chemical Company
   b. "FIBERMESH INFORCE e3 or STEALTH e3", SI Concrete Systems
   c. "FORTA SUPER-NET", Forta Corporation
   d. "NYCON FIBERS", Nycon, Inc.
3. Fibers to be added in manufacturer's approved amount with a minimum of 1.5 pounds per cubic yard for poly and 1.0 pounds per cubic yard for nylon.
4. Concrete to be batched and mixed in accordance with fiber manufacturer's recommendations for uniform and complete dispersion of fiber bundles into single strands within concrete.
5. Reinforcing fibers may be used in concrete slabs-on-grade in lieu of WWF with approval of the engineer.
6. Submit product data for review and approval.
7. For a "non-hairy" surface use a monofilament fiber. Collated fibrillated fibers wear away in a short period of time.

D. FIBROUS REINFORCING (alternate to wwf on composite metal decks)

1. All fibers must meet the criteria in the Steel Deck Institute design manual (Publication No. 30).
2. Cold drawn steel fibers meeting the criteria of ASTM A820, at a minimum addition rate of 25 lb/yd3 (14.8 kg/m3) and possessing an average residual strength of at least 80 psi 550 kpa when tested ASTM C1399, may be used as a suitable alternative to the welded wire fabric specified for temperature and shrinkage reinforcement.
3. Reinforcing fiber to be supplied by the following approved suppliers:
   a. "NOVOMESH 850, or NOVOCON 1050" by SI Concrete Systems
   b. "DRAMIX 65/60" by Bekaert
4. Steel fibers do not replace rebar over girders, which are used to control negative moment.
5. Steel fibers are to be added at the batch plant and in accordance with the manufacturer's recommendations for uniform and complete dispersion.

PART 3 EXECUTION

3.1 PLACING

A. GENERAL

1. Place reinforcing in conformance with the requirements of CRSI 63. Place reinforcement in proper position prior to placing concrete. Placing reinforcement during concrete placement will not be permitted.
2. Unless otherwise shown or indicated, provide minimum concrete protective covering for reinforcement as follows:
   a. Concrete deposited against the ground, 3".
   b. Formed surfaces exposed to weather or in contact with the ground, 2" for reinforcing bars No. 6 or larger, and 1-1/2" for reinforcing bars No. 5 or smaller.
   c. Interior surfaces, 1-1/2" for beams, girders and columns, 3/4" for slabs, walls and joists.
   d. See drawing for special conditions.
3. Support reinforcing for slabs-on-grade on staggered concrete bricks or metal or plastic bar chairs and spacers with metal plates.
4. Unless specifically authorized, do not bend reinforcement partially embedded in hardened concrete.
5. Support and fasten all dowels in the formwork prior to placing concrete. Do not place dowels after concrete is in place.

3.2 JOINTS

A. CONSTRUCTION JOINTS

1. Construction joints not shown in the contract documents must be located and made to least impair the strength of the structure.
2. No horizontal construction joints will be permitted in beams, girders or slabs.
3. Location of any construction joint not shown is subject to review and acceptance by Engineer.
4. Reinforcing is continuous through all construction joints. Obtain bond by roughening surface of concrete in an acceptable manner which will expose aggregate uniformly and will not leave any latence, loosened particles or aggregate or damaged concrete at surface.
5. Construction joints shall be cleaned, wetted, and standing water removed.
6. All concrete shall be thoroughly consolidated by suitable means during placement and should be worked around reinforcement and embedded fixtures and into corners of forms.
7. Concrete wet cure time to be 7 days minimum at 50 degrees minimum temperature.

B. EXPANSION JOINTS

1. Reinforcement or other embedded metal items bonded to the concrete (except dowels in floors bonded on only one side of joints) will not be permitted to extend continuously through any expansion joint.

C. DOWELED SLIP JOINTS

1. Use completely smooth round bars for dowels.
2. For construction joints, paint half of bar with red lead paint. When dry, coat painted end with satisfactory grease to insure against bond with concrete.
3. For control joints, paint and grease entire bar.

4. For expansion joints, paint, grease and provide a metal expansion cap for one end.
5. Place in forms to insure that bars are perpendicular to joint face. Stop reinforcement at doweled slip joints so that it will not extend through joint.

D. JOINT MATERIALS

1. Expansion joint filler non-bituminous type - ASTM D 1752, resin impregnated fiberboard Homosote 300 or Thermosetting Polyurethane, W. R. Meadows' Rescor. Asphalt impregnated materials are unacceptable.
2. Polyethylene Film - ASTM D 2103 minimum 6 mil.
3. Horizontal Joint Sealer - 2-component self-leveling urethane conforming to Federal Specification TT-S-227E, Type 1, Class A. Color to match concrete. Acceptable products are:

TYPE	MANUFACTURER
Daraseal-U	A. C. Horn
Sonolastic SL2	Sonneborn
Pourthane	W. R. Meadows

4. Vertical Joint Sealer - 1-component Polyurethane conforming to Federal Specification TT-S-002306, Type II, Class A, color to match concrete.
Acceptable products are:

TYPE	MANUFACTURER
SIKAFLEX IA	SIKA
SONOLASTIC NPI	Sonneborn

5. Epoxy Joint Sealer - semi-rigid epoxy, MM80 as manufactured by Metzger McGuire Co., master fill 300 by Master Builders.
6. Epoxy Bond - 2-component 100 percent solids epoxy resin, amine cured. Acceptable materials are Concresive Series by Master Builders, Sonneborn=s Epogrip and Epiweld 580 by Lambert Corp.
7. Epoxy Grout - Epoxy bond filled with suitable mineral filler, 100 percent passing the No. 100 sieve, in ratio to insure thixotropic action without impairment of adhesive properties.
8. Compressive Joint Material - expanded polystyrene having a compressive strength not less than 8 psi when the board is compressed to a deformation of 5 percent of its original thickness when tested in conformance with ASTM C 165, modified to change drying temperature to 150oF.
9. Felt - 30 pound asphalt or coal tar roofing felt ASTM D 226 or D 227.

E. PLACING DOWELS IN EXISTING CONCRETE

1. Use deformed reinforcing bars as dowels. Drill holes in existing concrete of size 1/2" larger in diameter than the dowel using power-driven drill with tungsten-carbide tipped bit ground to insure against oversize hole. Clean out holes with air.
Thoroughly swab surfaces of hole and embedded portion of dowel with epoxy grout. Force dowel into place. Wipe off excess grout and let set for not less than 12 hours at a temperature above 60°F.

3.3 FORMWORK

A. GENERAL

1. Provide and construct formwork in accordance with ACI 301 and 347.
2. Form design by P.E. registered in the State of Florida.

3. Observe and check formwork continuously while concrete is being placed to determine that there are no evidences of changes of elevations, plumbness, or camber and adjust forms as necessary. If, during construction, any such evidence or other defect appears, stop the work, remove concrete placed, if necessary, and repair formwork or supports before proceeding.
4. Earth cuts may be used as forms for footing vertical surfaces increase size 2 inch.
5. Forms and shoring is the responsibility of General Contractor.

B. FORMWORK MATERIALS

1. Make forms of lumber, plywood, metal or other materials suitable to provide the strength and tolerances specified herein before and the surface finishes specified hereinafter.
2. Forming exposed surfaces use any of the following materials as suitable for the specified finish, and to produce smooth uniform surfaces, true-to-line, in order that surfaces produced will require little finishing:
   a. New plastic-bonded natural plywood, American Plywood Association, HD Overlay Plyform Class I, Ext-APA, or equal.
3. For forming exposed surfaces use plywood, or other nonmetallic surfaces free from knots, warps, breaks, or other defects likely to cause irregular surfaces.
4. Provide commercial formulation form coating compounds with maximum VOC of 350 mg/1 that will not bond with stain or adversely affect concrete surfaces and will not impair subsequent surface treatments.

C. REMOVAL OF FORMS

1. Forms and shoring in the formwork supporting the weight of concrete, in beams, slabs and other structural elements are to remain in place until the concrete has reached its specified 28-day compressive strength.
2. Formwork and facing forms for members such as grade beams, foundation walls and spread footings not supporting the weight of concrete may be removed as soon as the concrete has hardened sufficiently to resist damage from the removal operations.
3. Arrange shores and other vertical supports so that the non-load carrying form-facing material may be removed without loosening or disturbing the shores and supports.
4. Whenever the formwork is removed during the curing period, continue curing of both the unexposed and exposed concrete by one of the methods specified in section "Curing and Protection".

D. REMOVAL STRENGTH

1. Removal Strength - The concrete will be presumed to have reached its specified strength when additional test cylinders (paid for by contractor) are field cured along with the concrete they represent and have reached the strength specified.

3.4 REPAIR OF SURFACE DEFECTS

A. GENERAL

1. Patch all tie holes and repair all honeycombed and defective areas immediately after form removal.
2. For surfaces other than those to be backfilled against, use patching mortar.
3. For surfaces to be backfilled against, use mastic damp-proofing compound, except that where reinforcing is exposed, use patching mortar.

4. Remove all honeycombed and defective concrete down to sound concrete prior to patching. Thoroughly clean the holes of dirt and debris.

B. PATCHING MORTAR

1. Cut edges of honeycombed and defective concrete to form dove-tail (undercut) joints. No feather edges will be permitted.
2. Apply a chemical bonding agent to voided surface. An acceptable product is L&M Construction chemicals – Everbond or equivalent.
3. Patch the cement mortar as specified in ACI 301, or with proprietary patching compounds, except that proprietary patching mixtures may be not used on exposed surfaces.
4. Acceptable proprietary patching mixtures are:
   a. Euclid Chemical Corporation - Poly Patch
   b. SIKA - Sikaset Mortar
   c. Emaco R Series - Master Builders
   d. Lambert Corp, Lambco Vinyl Patch
   e. Sonneborn - Sonopatch

C. MASTIC DAMP-PROOFING COMPOUND

1. Patch full depth of hole and flush the surface with emulsified asphalt mastic heavy viscosity for trowel application. Prepare and place in accordance with manufacturer's directions. Acceptable products are:
   a. W. R. Meadows - Sealmastic Trowel Mastic
   b. Euclid Chemical Company - Damp-proofing Asphalt Coatings
   c. Sonneborn - Hydrocide 700 Mastic
   d. Lambert Corp – Waterban 60M

3.5 FINISHING OF FORMED SURFACES - GENERAL

A. After removal of forms, give surfaces of concrete the following finishes as specified in ACI 301.

SURFACE	FINISH
Unexposed	Rough Form
Exposed	Smooth Form
Exposed to Public View	Smooth Rubbed

3.6 CURING AND PROTECTION

A. GENERAL

1. Conform to the applicable detailed recommendations of ACI 301 and 308.
2. Hot weather curing to be in accordance with applicable ACI Standard 305.
3. All cast-in-place concrete must be maintained with minimal moisture loss at a relatively constant temperature for a minimum of 7 days following the placing of the concrete by the use of a water spray, water saturated fabric, moisture retaining membrane or liquid curing compound.
4. Full curing days will be determined by the cumulative number of days or fractions thereof during which the temperature of the air in contact with the concrete is above 50oF.
5. Cure slabs-on-grade for the first 72 hours by the use of:
   a. fog spraying

b. ponding

c. sprinkling

d. continuously wet absorptive mats or fabric

e. continue curing by use of moisture retaining cover until concrete has obtained its specified 28 day compressive strength

f. or liquid curing compound after finishing process is completed.

g. concrete wet cure time to be 7 days minimum at 50 degrees minimum temperature.

6. Submit materials and method of curing for review.

7. Do not use moisture retaining curing compounds for curing surfaces to receive the following coverings, unless it has been demonstrated that such compounds will not prevent bond of:

a. Carpet

b. Flexible flooring

c. Ceramic tiled floors

d. Other specified floor systems

B. MATERIALS

1. Where moisture retaining membranes or curing compounds are used for curing, provide only materials conforming to the following requirements:

a. Polyethylene Film - ASTM C171, Type II

b. Waterproof Paper - ASTM C 171, Type I

c. Absorptive Cover - AASHTO M 182, Class 3, Burlap cloth made from Jute or Kenaf or ASTM C 440 cotton mats

d. ASTM C309 spray on at max.

C. TEMPERATURE, WIND AND HUMIDITY

1. Do not permit concrete not fully cured to be exposed to excessive temperature changes or high winds.

3.7 EMBEDDED ITEMS

A. GENERAL

1. Prior to concreting, place all embedded items to be provided under this subdivision or to be furnished under other subdivisions for installation under this subdivision.

2. Give all contractors whose work is related to the concrete or must be supported by it, ample notice and opportunity to introduce and/or furnish embedded items before the concrete is placed.

3. Make certain that all embedded items furnished and set in forms by them are secured in position, and exercise due care not to disturb or damage their work while placing concrete.

4. Set anchor bolts for steel and equipment in accordance with setting drawings or templates which have been reviewed and found satisfactory.

5. Where holes in concrete for such purposes as recesses for railing posts, passageways for pipes, and the like are shown formed by sleeves, the contractor may, at his option, provide such holes by drilling with a acceptable diamond or tungsten carbide tipped drill bits. Fill with epoxy seal after railings are in place.

B. EMBEDDED ITEMS TO BE PROVIDED UNDER THIS SUBDIVISION

1. Dovetail anchor slots and dovetail brick anchors - DAS-G20 beehive dovetail anchor slot as manufactured by Gateway Building Products, together with DBA-G14 dovetail brick anchors. provide masonry trades with one anchor for each 16" of anchor slot or fraction thereof plus one additional anchor for each vertical section. Place anchor slots 1'-4" on center in beams and walls where masonry abuts and one slot in each face of each column faced with masonry. Furnish anchors to space 16" on center in slots.
2. Plastic reglets for above and below grade counter flashing. Make of Type A rigid polyvinyl chloride, 0.060" thick, as manufactured by Superior Concrete Accessories, Inc. or equal.
3. Sleeves - galvanized steel pipe ASTM A 120, or plastic pipe ASTM D 2661, ASTM D 2665 or ASTM D 2852, bituminized fiber pipe conforming to ASTM D 1861 or Wilson anchor bolt sleeve.
4. Column Anchor Bolts - ASTM F 1554. Furnish with one leveling nut plus one nut and one washer.
5. Anchor Bolts – ASTM A 307. As shown on drawings.
6. Cast Iron Frames and Grates - as manufactured by Neenah Foundry Company. Castings as manufactured by Flockhart Foundry Company or McKinley Iron Works may be acceptable, provided the dimensions and design are comparable in all respects.
7. Water stops locations as shown on drawings.

3.8 VAPOR RETARDER

1. Provide sub-grade under concrete slabs-on-grade with vapor retarder consisting of polyethylene film not thinner than 10 mils, conforming to ASTM E1745, or asphalt laminated reinforced Kraft paper with polyethylene coating on both sides. Moistop as manufactured by FortiFiber Building Systems Group.
2. Provide film in width and length not less than one foot larger than dimensions of slab sub-grade unless patently impracticable. Lap edges not less than 6" and tape continuously. Take care to avoid puncturing film. Immediately prior to placing concrete, tape-seal all tears, cuts and holes.

3.9 GROUTING OF BASE PLATES

1. Nonferrous grout acceptable products are:

TYPE	MANUFACTURER
Crystex	L&M Construction Chemicals
Five Star	U.S. Grout
Sonogrout	Sonneborn
Euco N.S.	Euclid Chemical Company
Construction Grout	Master Builders
Vibroprvf #11	Lambert Corp.

2. Mix and place in conformance with printed instructions of the manufacturer.

3.10 TESTING

A. GENERAL

1. The services of an independent testing laboratory shall be retained for obtaining test specimens and performing quality control work, routine testing of materials or proposed mix designs and of resulting concrete for compliance with technical requirements of specifications.
2. Testing of field-cured test cylinders, or testing required because of changes requested by contractor in materials or proportions of the mix, as well as any extra testing of concrete or materials occasioned by failure to meet specification requirements, to be at contractor's expense.
3. Failure of the testing laboratory to detect any defective work or materials is not in any way to prevent later rejection when such defect is discovered, nor is it to obligate the owner for final acceptance.
4. The testing agency and/or its representatives are not authorized to revoke, alter, relax, enlarge or release any requirement of the specifications, not to approve or accept any portion of the work, not to act as foreman or perform other duties for contractor.

B. SERVICES PROVIDED BY THE TESTING AGENCY

1. Field Sampling - Secure from different batches, on a truly random basis, composite samples for all field testing required below in accordance with ASTM C 172 where applicable. Take all samples at discharge end of conveying system. Clearly mark each test specimen master as to exact part of the structure represented, class of concrete curing conditions, temperature of concrete, and time and date of sample.
2. Compressive Strength Test - mold and cure test cylinders in accordance with ASTM C 31 and test each cylinder for strength in accordance with ASTM C 39. Take one "test set" consisting of three cylinders for each day's pour of 100 cubic yards, or fraction thereof. Test cylinders one at 7 and one 28 days, one hold.
3. Slump Tests - determine slump range for each "test set" in conformance with ASTM C 143.
4. Air Content Test - determine air content for each "test set" for air-entrained concrete in accordance with ASTM C 231.
5. Submit two copies of the results in each of the above tests and inspection to the contractor and the owner's representative and Engineer.
6. Should any of the test results fail to meet the requirements specified, make an immediate telephone report to the contractor and the owner's representative.
7. Furnish evaluation reports of compression tests as recommended by ACI 214 when any compression test fails to meet the specified strength.
8. Criteria for acceptance of concrete cylinder tests:
   a) Every arithmetic average of any consecutive three tests equals or exceed f'c, and
   b) No individual strength test (average of two cylinders) <f'c by more than 500 psi.

3.11 ACCEPTANCE OF STRUCTURE

A. GENERAL

1. Acceptance of structure will be made in conformance with ACI 301, except that contractor must pay all costs incurred for providing any additional testing or analysis required when strength of structure is considered potentially deficient.

B. CRACKS

1. The contractor will be required to restore without cost to the owner any concrete which develops cracks within a period of one year after placement which has not been caused by action of the owner or others in over stressing the concrete.
2. Repair the cracks by means that will restore the cracked members to their designed strength and appearance by acceptable methods which will not impair the appearance of the affected surfaces, if exposed. Such repairs must be performed by use of suitable epoxy cements employed by an organization having satisfactorily demonstrated ability in the techniques necessary to effect such repairs, or by other acceptable methods.

END OF SECTION

SECTION 03 4800 - PRECAST CONCRETE U-LINTELS AND SILLS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes: precast concrete U-lintels and sills

B. Related Sections:

1. Concrete Masonry Units
2. Concrete Reinforcement
3. Cast-in-Place Concrete

1.2 REFERENCES

A. American Society for Testing and Materials(ASTM)

1. C33 – Specification for Concrete Aggregates
2. C150 – Specification for Portland Cement

B. Precast/Pre-Stressed Concrete Institute (PCI) Standards: Manual for Quality Control for Precast and Pre-Stressed Concrete MNL-116.

C. American Concrete Institute: Building Code Requirements for Structural Concrete (ACI 318)

D. American Concrete Institute: Building Code Requirements for Masonry Structures (ACI 530)

1.3 SUBMITTALS

A. Provide manufacturer's catalog engineering data.

B. Manufacturer shall rate U-lintel units for gravity, uplift, and lateral loads in units of pounds per linear foot.

1.4 QUALITY ASSURANCE

A. Fabricator's Qualifications: Units shall be fabricated by a firm engaged in the manufacturing of precast and pre-stressed concrete U-lintels and sills for a minimum of 5 years. Fabricator shall have a quality assurance program that complies with the procedures of Manual 116 by the Precast/Pre-Stressed Concrete Institute (PCI).

B. Plant records of production and quality control shall be kept in accordance with PCI recommendations and made available upon request for the Architect.

1.5 DELIVERY, STORAGE AND HANDLING

A. If storage is required prior to erection, take all necessary precautions to provide protection to prevent damage prior to installation. Maintain units free of dirt and airborne pollutants until immediately prior to erection.

B. Replace all units that are damaged due to mishandling at the job site.

PART 2 PRODUCTS

2.1 MATERIALS

A. Concrete Materials

1. Portland Cement: ASTM C150 Type I or III, gray color
2. Aggregates: ASTM C33
3. Water: Potable
4. Admixtures: Shall not contain calcium chloride or chloride ions

2.2 FABRICATION

A. Unless specified otherwise, conform to PCI MNL-116.

B. All U-lintel units 14 feet in overall length and shorter shall be made of concrete with a minimum strength of 3500 psi at 28 days.

C. All U-lintel units exceeding 14 feet in overall length shall be made of concrete with a minimum strength of 6000 psi at 28 days and shall be pre-stressed concrete.

D. All sill units shall be made of concrete with a minimum strength of 3000 psi at 28 days.

E. All units shall be sand block finish except pre-stressed, 6" wide, and 12" wide U-lintels shall be smooth form finished.

F. Tolerances shall be per PCI MNL-116.

G. Minor patching in plant is acceptable provided structural adequacy of units is not impaired.

PART 3 EXECUTION

3.1 FURNISHING

A. Furnish to the concrete masonry unit installer, all units that will be installed as part of the work of that section.

3.2 PROTECTION

A. Protect all stored and installed units from job site debris and impact.

B. Units damaged during storage shall be replaced if beyond repair to restore its structural adequacy.

END OF SECTION

SECTION 04 2000 - UNIT MASONRY

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 this Section.

1.2 SCOPE OF WORK

A. Provide labor, material, equipment and perform operations necessary for, and incidental to, erection of masonry work.

B. Related sections: The following sections contain requirements that relate to this section:

1. Division 3 section "Cast-in-Place Concrete"

C. Products installed but not furnished under this Section include the following:

1. Steel lintels in unit masonry are specified in Division 5 Section "Metal Fabrication".
2. Wood nailers and blocking built into unit masonry are specified in Division 6 Section "Rough Carpentry".
3. Reglets in masonry joints for metal flashing are specified in Division 7 Section Flashing and Sheet Metal".
4. Hollow metal frames in unit masonry openings are specified in Division 8 Section "Steel Doors and Frames".
5. Hollow metal frames in unit masonry openings are specified in Division 8 Section "Custom Hollow Metal Work".
6. Sealants

1.3 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops the following installed compressive strengths (f'm):

1. f'm = 2000 psi on net area.

1.4 SUBMITTALS

A. Submit for review, manufacturers literature and/or drawings of material that is pre-fabricated or pre-assembled.

1. Product data for each different masonry unit, accessory, and other manufactured product indicated.
2. Shop drawings for reinforcing detailing fabrication, bending, and placement of unit masonry reinforcing bars. Comply with ACI 315 "Details and Detailing of Concrete Reinforcing" showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of masonry reinforcement.
3. Submitted shop drawings must be checked and signed by the General Contractor.
4. Material certificates signed by manufacturer and Contractor certifying that each type of masonry unit complies with requirements specified in referenced unit masonry standard, including fire performance characteristics.

5. Hot weather construction procedures evidencing compliance with requirements specified in referenced unit masonry standard.
6. Results from tests and inspections performed by Owner's representatives will be reported promptly and in writing to Architect and Contractor.

1.5 QUALITY ASSURANCE

A. Unit masonry standard: ACI 530.1/ASCE 6 "Specifications for Masonry Structures".

B. Fire performance characteristics: Where indicated, provide materials and construction identical to those of assemblies whose fire resistances has been determined per ASTM E 119 by a testing and inspecting organization, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

C. Single source responsibility for masonry units: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from the manufacturer for each cementitious component and from one source and producer for each aggregate.

D. The contractor shall retain a qualified testing laboratory to perform the following tests:

1. Sample and test grout in accordance with ASTM C1019 for each 5000 square foot of masonry.
2. Slump tests - ASTM C143.

E. When requested by the Architect/Engineer, a qualified testing laboratory shall be retained to perform masonry prism test in accordance with ASTM E447, Method B, modified as follows:

1. Prisms shall be stack bond, one unit long and thick with a full mortar bed.
2. Limit height/thickness ratio from 1.33 - 5.00
3. Provide a minimum of one joint.

One set of three (3) prisms prior to construction and during construction for each 5000 square feet of wall.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry material to project in undamaged condition.

B. Store and handle masonry units off the ground, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not place until units are in an air-dried condition.

C. Store cementitious materials off the ground, under cover, and in dry location.

D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

E. Store masonry accessories including metal items to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

A. Protection of masonry: During erection, 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.

B. Extend cover to minimum of 24 inches down both sides and hold cover securely in place.

C. Where one wythe of multi-wythe 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.

D. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

E. Stain prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Remove immediately any grout, mortar, and soil that come in contact with such masonry.

F. Protect base of walls from rain splashed mud and mortar splatter by means of covering spread on ground and over wall surface.

G. Protect sills, ledges, and projections from mortar droppings.

H. Protect surfaces of window and door frames, as well as similar products with painted and integral finish from mortar droppings.

I. Hot weather construction: Comply with referenced unit masonry standard.

PART 2 GENERAL

2.1 MATERIALS - GENERAL

A. Comply with referenced unit masonry standard and other requirements specified in this Section applicable to each material indicated.

2.2 CONCRETE MASONRY UNITS

A. General: Comply with requirements indicated below applicable to each form of concrete masonry required.

B. Masonry Units for Fire-Rated Walls

1. Provide fire-rated units which are rated product of manufacturer listed in latest revision of building materials list, published by UL. In lieu of above rating, furnish fire resistive units on basis of examination, tests and report by nationally recognized testing agency acceptable to governing authorities and codes having jurisdiction. Report must state that units proposed to be furnished are equivalent in fire rating to those products furnished by producers in above UL building materials list.

C. Size: Provide concrete masonry units complying with requirements indicated below for size that are manufactured to specified face dimensions within tolerances specified in the applicable referenced ASTM specification for concrete masonry units.

D. Concrete masonry units: Manufactured to specified dimensions of 3/8 inch less than nominal widths by nominal heights by nominal lengths indicated on drawings.

E. Provide Type II, non-moisture controlled units.

F. Exposed faces: Manufacturer's standard color and texture, unless otherwise indicated.

G. Hollow load-bearing concrete masonry units: ASTM C 90, Grade N and as follows:

1. Unit compressive strength: Provide units with minimum average net area compressive strength indicated below. Not less than the unit compressive strengths required to produce concrete unit masonry construction of compressive strength indicated.

2. Use inspection and cleanout holes at bottom of wall reinforced vertical cells for grouting lifts over 5 feet high. Cleanout holes should be 3" minimum, see ACI 530.1-02, Section 3.2F. See grout space requirements for various grout pour heights in ACI 530.1-02, Section 3.5C with Table 7. See Florida Building Code page 35.1

H. Weight classification: Normal weight

2.3 MORTAR AND GROUT MATERIALS

A. Mortar - Type S

B. Grout - 2500 psi at 28 days

C. Portland cement: ASTM C 150, Type I or II. Provide natural color.

D. Ready-mixed mortar: Cementitious materials, water, and aggregate complying with requirements specified in this article, combined with set controlling admixtures to produce a ready-mixed mortar complying with ASTM C 270.

E. Hydrated lime: ASTM C 207, Type S.

F. Aggregate for mortar: ASTM C 144, except for joints less than 1/4 inch use aggregate graded with 100 percent passing the No. 16 sieve.

G. Aggregate for grout: ASTM C 404.

H. Water: Clean and potable.

2.4 REINFORCING STEEL

A. General: Provide reinforcing steel complying with requirements of referenced unit masonry standard and this article, formed from the following:

1. Galvanized carbon steel wire, coating class as required by referenced unit masonry standard for application indicated.

B. Description: Welded wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet, with prefabricated corner an tee units, and complying with requirements indicated below:

1. Wire diameter for side rods: 0.1483 inch (9 gage).

C. For single wythe masonry provide type as follows with single pair of side rods:

1. Ladder design with perpendicular cross rods spaced not more than 16 inches O.C.

D. For multi-wythe masonry provide type as follows:

1. Ladder design with perpendicular cross spaced not more than 16 inches O.C.

2. Number of side rods for multi wythe concrete masonry: One side rod for each face shell of hollow masonry units more than 4 inches or less in nominal width.

E. Tab design with single pair of side rods and rectangular box-type cross ties spaced not more than 16 inches O.C., with side rods spaced for embedment within each face shell of backup wythe and ties extended to engage the outer wythe by at least 1-1/2" inches.

F. Use units with adjustable two piece rectangular ties where horizontal joints of facing wythe do not align with those of backup by more than and where indicated.

G. Available manufacturers: Subject to compliance with requirements, manufacturers offering joint reinforcement that may be incorporated in the work include, but are not limited to, the following:

1. AA Wire Products/Hohmann & Barnard, Inc.

2. Dur-O-Wal, Inc.

3. Masonry Reinforcing Corporation of America

2.5 TIES AND ANCHORS

A. General: Provide ties and anchors specified in subsequent articles that comply with requirements for metal and size of reference unit masonry standard and this article.

B. Galvanized carbon steel wire: ASTM A 82, coating class as required by referenced unit masonry standard for application indicated.

C. Wire diameter: 0.1875 inch.

D. Galvanized heavy thickness steel sheet: ASTM A 635 (commercial quality) hot-rolled carbon steel sheet hot-dip galvanized after fabrication to comply with ASTM A 525, Class B3, for rigid anchors fabricated from steel sheet or strip with a thickness of 0.180 inch and greater.

E. Steel plates and bars: ASTM A 36, hot dipped galvanized to comply with ASTM A 123 or ASTM A 153, Class B3, as applicable to size and form indicated.

F. Available manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:

1. Dur-O-Wal, Inc.
2. Heckman Building Products, Inc.
3. Hohmann & Barnard, Inc.

2.6 BENT WIRE TIES

A. Individual units prefabricated from bent wire to comply with requirements indicated below:

1. Tie shape for hollow masonry units laid with cells vertical: Rectangular with closed ends and not less than 4 inches wide.

B. Type for masonry where coursing between wythes align: Unit ties bent from one piece of wire.

C. Type for masonry where coursing between wythes does not align: Adjustable ties composed of two parts, one with pintles, the other with eyes, maximum misalignment 1-1/4 inches.

2.7 ADJUSTABLE ANCHORS FOR CONNECTING MASONRY TO STRUCTURAL WORK

A. General: Two piece assemblies as described below allowing vertical or horizontal differential movement between wall and framework parallel to plane of wall, but resisting tension and compression forces perpendicular to it.

B. For anchorage to concrete framework, provide manufacturer's standard with dovetail anchor section formed from sheet metal and triangular shaped wire ties section seized to extend within 1 inch of masonry face and as follows:

1. Wire diameter: 0.1875 inch

2.8 MISCELLANEOUS ANCHORS

A. Unit type masonry inserts in concrete: Cast iron or malleable iron inserts of type and sized indicated.

B. Dovetail slots: Furnished dovetail slots, with filler strips, or slot size indicated, fabricated from 0.0336 inch (22 gage) sheet metal.

2.9 POST-INSTALLED ANCHORS

A. Anchors as described below, with capacity to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E 488, conducted by a qualified independent testing laboratory.

1. Type: Chemical anchors
2. Type: Expansion anchors

B. Corrosion protection: Carbon steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (5 microns) for Class SC 1 service condition (mild).

C. For cast-in-place and post-installed anchors in concrete: Capability to sustain, without failure, a load equal to 4 times loads imposed by masonry.

D. For post-installed anchors in grouted concrete masonry units: Capability to sustain, without failure, a load equal to 6 times loads imposed by masonry.

2.10 MISCELLANEOUS MASONRY ACCESSORIES

A. Non-metallic expansion joint strips: Pre-molded filler strips complying with ASTM D 1056, Type 2 (closed cell), Class A (cellular rubber and rubber-like materials with specific resistance to petroleum base oils), Grade 1 (compression deflection range of 2-5 psi), compressible up to 35 percent, of width and thickness indicated, formulated from the following material:

1. Neoprene
2. Urethane
3. Polyvinyl chloride

B. Pre-formed control joint gaskets: Materials as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

1. Styrene-Butadiene rubber compound: ASTM D 2000, Designation 2AA-805
2. Polyvinyl Chloride: ASTM D 2287, General Purpose Grade, Type PVC-65406

C. Bond breaker strips: Asphalt saturated organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

2.11 MASONRY CLEANERS

A. Job mixed detergent solution: Solution of trisodium phosphate (1/2 cup dry measure) dissolved in one gallon of water.

B. Job mixed muriatic solution: Solution of 1 part muriatic acid and 10 parts clean water, mixed in a non-metallic container with acid added to water.

C. Proprietary acidic cleaner: Manufacturer's standard strength, general purpose cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry surfaces of type indicated below without discoloring or damaging masonry surfaces; expressly approved for intended use by manufacturer of masonry units being cleaned.

D. For masonry not subject to metallic oxidation stains, use formulation consisting of a concentrated blend of surface acting acids, cheating, and wetting agents.

E. For masonry subject to metallic oxidation stains, use formulation consisting of a liquid blend of organic and inorganic acids and special inhibitors.

F. Available products: Subject to compliance with requirements, a product that may be used to clean until masonry surfaces includes, but is not limited to, the following:

1. "Sure Klean No. 600 Detergent", ProSoCo, Inc.
2. "Sure Klean No. 101 Lime Solvent", ProSoCo, Inc.
3. "Sure Klean Vana Trol", ProSoCo, Inc.

2.12 MORTAR AND GROUT MIXES

A. General: Do not add admixtures including coloring pigments, air-entraining agents, antifreeze compounds, or admixtures, unless otherwise indicated.

B. Do not use calcium chloride in mortar or grout.

C. Procedures of ASTM C780 is to be used to test and evaluate mortar and establish pre-construction datum and quality control testing for types of mortar indicated below:

1. Type S

D. Grout for unit masonry: Comply with ASTM C 476 and referenced unit masonry standard.

2.13 SOURCE QUALITY CONTROL

A. Concrete masonry unit tests: For each type, class, and grade of concrete masonry unit indicated, units will be tested by qualified independent testing laboratory for strength, absorption, and moisture content per ASTM C 140, if required by Architect.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other specific conditions, and other conditions affecting performance of unit masonry.

B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION - GENERAL

A. Mix mortar and grout in power driven, drum type mixers. Operate mixer a minimum of 5 minutes after addition of all materials.

B. Comply with referenced unit masonry standard and other masonry construction to the full thickness shown. Build single wythe walls to the actual thickness of the masonry units, using units of nominal thickness indicated.

C. Build chases and recesses as shown or required to accommodate items specified in this and other sections of the specifications. Provide not less than 8 inches of masonry between chase or recess and jamb of openings and between adjacent chases and recesses. Coordinate masonry with all adjacent work of other trades.

D. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction immediately adjacent to the opening.

E. Cut masonry units with motor driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining constructions. Use full size units without cutting where possible.

F. Matching existing masonry: Where applicable, match coursing, bonding, color, and texture of new masonry with existing masonry.

G. Do not use masonry units with chips, cracks, voids, discolorations or other defects.

3.3 CONSTRUCTION TOLERANCES

A. Comply with construction tolerances of ACI 530 or N.C.M.A.

3.4 LAYING MASONRY WALLS

A. Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.

B. Lay up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.

C. Bond pattern for exposed masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4 inch horizontal face dimensions at corners or jambs.

1. One half running bond with vertical joint in each course centered on units in courses above and below.

D. Lay concealed masonry with all units in a wythe in running bond or bounded by lapping not less than 2 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.

E. Stopping and resuming work: In each course, rack back 1/2 unit length for one-half running bond or 1/3 unit length for one -third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly (if required), and remove loose masonry units and mortar prior to laying fresh masonry.

F. Re-temper mortar as necessary to keep plastic. Use no mortar after setting has begun or after 2 1/2 hours of initial mixing.

G. Built-in work: As construction progresses, built-in items specified under this and other sections of the specifications. Fill in solidly with masonry around built-in items.

H. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.

I. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

J. Fill cores in hollow concrete masonry units with grout 3 courses (24 inches) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

K. Reinforced vertical concrete blocks cells, grouting solid where indicated on plan.

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow concrete masonry units as follows: With full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.

3.6 HORIZONTAL JOINT REINFORCEMENT

A. General: Provide continuous horizontal joint reinforcement as indicated. Install longitudinal side rods in mortar for their entire length with a minimum cover of 5/8 inch of exterior side of walls, 1/2 inch elsewhere. Lap reinforcing a minimum of 6 inches.

B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bed reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

D. Provide horizontal joint reinforcement at doors and windows for first and second block course above and below apertures. Run reinforcing continuous or extend two feet from aperture edge.

3.7 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Provide an open space not less than 1 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.

2. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.

3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 26 inches o.c. horizontally.

3.8 MOVEMENT (CONTROL AND EXPANSION) JOINTS

A. General: Install control and expansion joints in unit masonry where indicated. Build in related items as masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.

B. Form control joints in concrete masonry as follows:

1. Fit bond breaker strips on in ends of block units on one side of control joint. Fill the joint with mortar and rake joints in exposed faces.

3.9 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry lintels where shown and wherever openings of more than 1'-0" for brick size units and 2'-0" for block size units are shown without structural steel or other supporting lintels. Provide reinforced precast concrete lintels. Cure precast lintels before handling and installation.

C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.10 INSTALLATION OF REINFORCED UNIT MASONRY

A. General: Install reinforced unit masonry to comply with requirements or referenced unit masonry standard.

B. Temporary formwork: Construct formwork and shores to support reinforced masonry elements during construction. Contractor is completely responsible for the proper design and construction of all temporary forms and bracing.

C. Construct formwork to conform to shape, line, and dimensions shown. Make 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.

D. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.

E. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

3.11 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units and in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point up all joints including corners, openings, and adjacent construction to provide a neat, uniform appearance, prepared for application of sealants.

C. 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 non-metallic scrape hoes or chisels.

2. Test cleaning methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.

3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.

4. Wet all surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
5. Clean concrete masonry by means of cleaning method indicated in N.C.M.A. TEK 45 applicable to type of stain present on exposed surfaces.

D. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure unit masonry is without damage and deterioration at time of substantial completion.

END OF SECTION

SECTION 05 0513 - HOT DIP GALVANIZING

PART I GENERAL

1.1 Work Included

A. Hot dip galvanizing of iron and steel materials.

1.2 Related Work

A. Steel materials, fabrications, and assemblies are specified to be furnished and installed in various other sections.

1.3 References

A. Publications

1. American Galvanizers Association (AGA)

   Inspection of Products Hot Dip Galvanized after Fabrication

   The Design of Products to be Hot Dip Galvanized after Fabrication

   Recommended Details of Galvanized Structures

2. Research Council on Structural Connections of the Engineering Foundation

3. Specification for Structural Joints Using ASTM A325 or A490 Bolts

B. Reference Standards

1. American Society for Testing and Materials (ASTM):

   A123 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

   A143 Safeguarding Against Embrittlement of Hot-Dip Galvanized Steel Products and Procedure for Detecting Embrittlement

   A153 Zinc Coating (Hot-Dip) on Iron and Steel Hardware

   A384 Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Articles

   A385 Providing High-quality Zinc Coatings (Hot-Dip)

   A767 Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement

   A780 Repair of Damaged Hot-Dip Galvanized Coatings

2. Federal Specifications

   DOD-P-21035, Paint, High Zinc Dust Content, Galvanizing Repair

   MIL-P-26915, Primer Coating, Zinc Dust Pigmented

1.4 Quality Assurance

A. Coating Applicator: Company specializing in hot-dip galvanizing after fabrication and following the procedures of the Quality Assurance Manual of the American Galvanizers Association.

1.5 Submittals

A. Submit an original and two copies of the coating applicator's notarized Certificate of Compliance that the hot-dip galvanized coating meets or exceeds the specified requirements of ASTM A 123, A767 or A153 (as applicable).

1.6 Delivery, Storage and Handling

A. Load and store galvanized articles in accordance with accepted industry standards.

PART II PRODUCTS

2.1 Acceptable Coating Applicators

A. Members of the American Galvanizers Association or equal approved by the Architect and/or Engineer.

2.2 Steel Materials

A. Material for galvanizing to be geometrically suitable for galvanizing as described in ASTM A384 and A385. Steel materials suitable for galvanizing include structural shapes, pipe, sheet, fabrications and assemblies.

B. Material to be chemically suitable for galvanizing.
Steels containing carbon below 0.25 percent, phosphorus below 0.04 percent and manganese below 1.35 percent, either individually or in combination, and providing the silicon content is 0.05 percent or less, will normally develop a typical coating when conventional galvanizing techniques are applied.
In cases where a steel is selected for considerations other than galvanizing and the chemistry of the elements (C,Mn, P, and Si) exceeds the limits indicted above, the steel may be galvanizable. The galvanizer must be advised of the variation in advance so that he can determine of the material is galvanizable and whether or not special processing techniques will be required.
Experience has shown that silicon in the range of 0 to 0.04% produce coatings of normal integrity and performance. Steels with silicon contents significantly below 0.4% produce coatings of normal integrity and performance. Steels with silicon contents significantly below .04% may not achieve the designed minimum coating thickness'.
Recommended steel materials for hot-dip galvanizing include, but are not limited to:

1. Structural shapes and plates: ASTM A36, A242 type 2, A283, A441, A500, A501, A529, A572 and A588.
2. Steel for fasteners:

General Category	Bolt Material	Nut Material
Carbon Steel	A307 Gr A or B	A563 Gr A
High Strength	A394 A563	Gr DH or
Tower Bolts	A394 A563	Gr A
Quenched & Tempered		
Carbon Steel Bolts	A449	A563 Gr C
Quenched & Tempered		
Alloy Steel Bolts	A354 Gr BC	A 563 Gr DH

3. Steel for sheet metal articles: ASTM A569 or A570
4. Steel for pipe or tubing: ASTM A53, A120 or A595 Gr A or B

2.3 Fabrication Requirements

A. Fabricate structural steel in accordance with Class (I) (II) (III) guidelines as described in AGA's Recommended Details for Galvanized Structures.

B. Fabrication practices for products to be in accordance with the applicable portions of ASTM A143, A384, and A385, except as specified herein. Avoid fabrication techniques which could cause distortion or embrittlement of the steel.

C. The Fabricator shall consult with the Architect/Engineer and hot-dip galvanizer regarding potential problems or potential handling problems during the galvanizing process which may require modification of design before fabrication proceeds.

D. Remove all welding slag, splatter, anti-splatter compounds and burrs prior to delivery for galvanizing.

E. Provide holes and/or lifting lugs to facilitate handling during the galvanizing.

F. Avoid unsuitable marking paints. Consult with the galvanizer about removal of grease, oil paint and other deleterious material prior to fabrication.

G. Remove by blast cleaning or other methods surface contaminants and coatings which would not be removable by the normal chemical cleaning process in the galvanizing operation.

H. Whenever possible, slip joints should be used to minimize field welding of material.

PART III EXECUTION

3.1 Surface Preparation

A. Pre-clean steel work in accordance with accepted methods to produce an acceptable surface for quality hot-dip galvanizing.

3.2 Application of Coating

A. Galvanize steel members, fabrications, and assemblies after fabrication by the hot-dip process in accordance with ASTM A123.

B. Galvanize bolts, nuts and washers and iron and steel hardware components in accordance with ASTM A153.

C. Safeguard products against steel embrittlement in conformance with ASTM A143.

D. Galvanize reinforcing steel in accordance with ASTM A767.

E. Handle all articles to be galvanized in such a manner as to avoid any mechanical damage and to minimize distortion.

3.3 Coating Requirements

A. Coating Weight: conform with paragraph 5.1 of ASTM A123, Table 1 of A767, or Table 1 of ASTM A153, as appropriate. Special thickness requirements should refer to ASTM A123 3.1.7 and be specified as the minimum average mils of thickness. Extra thick coatings are not always obtainable.

B. Surface Finish: Continuous, adherent, as smo0th and evenly distributed as possible and free from any defect detrimental to the stated end use of the coated article.

C. Adhesion: Withstand normal handling consistent with the nature and thickness of the coating and normal use of the article.

3.4 Tests

A. Inspection and testing of hot-dip galvanized coatings shall be done under the guidelines provided in the AGA publication "Inspection of Products Hot Dip Galvanized After Fabrication".

B. Include visual examination and tests in accordance with ASTM A123, A767 or A153 as applicable to determine the thickness of the zinc coating on the metal surface.

C. Furnish Notarized Certificate of Compliance with ASTM Standards and Specifications herein listed. The Certificate must be signed by the galvanizer and contain a detailed description of the material processed. The Certificate shall include information as to the ASTM standard used for the coating.

3.5 Repair of Damaged Coating

A. The maximum area to be repaired is defined in accordance with ASTM A123 Section 4.6 current edition.

1. The maximum area to be repaired in the field shall be determined in advance by mutual agreement between parties.

B. Repair areas damaged by welding, flame cutting or during handling, transport or erection by one of the approved methods in accordance with ASTM A780 whenever damage exceeds 3/16" in width. Minimum thickness requirements for the repair are those described in ASTM A123 Section 4.6 current edition.

END OF SECTION

SECTION 05 1223 - STRUCTURAL STEEL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. All requirements of the general provisions of the contract including General and Supplementary Conditions, Division 0 and Division 1 forms a part of this section.

1.2 DESCRIPTION

A. SCOPE OF WORK

1. This Section includes fabrication, delivery, unload and store in locations directed and erect all structural steel work, as shown on drawings and specified, including schedules, notes, and details showing size and location of members, typical connections, and types of steel required.

B. Related work not specified under this subdivision:

1. Steel joist
2. Setting of anchor bolts, cast in concrete, or masonry.
3. Metal fabrications.

1.3 SUBMITTALS

A. Submit for review, complete shop drawings covering fabrication and erection of all work under this subdivision, including schedules, notes, and details showing size and location of members, typical connections, and types of steel required.

B. Submitted shop drawings must be checked and signed by the General Contractor.

C. Test reports conducted on shop and field bolted and welded connections. Include data on type(s) of test conducted and test results.

1.4 QUALITY ASSURANCE

A. Codes and standards: Comply with applicable provisions of the latest issue of the following, except as otherwise indicated:

1. American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges" - except paragraph 4.2.1. AISC "Specification for Structural Steel Buildings", including "Commentary".
2. "Specifications and Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Structural Connections.
3. Structural Welding Code (AWS D1.1)
4. Steel Structures Painting Council (SSPC)

B. Qualifications for welding work: Qualify welding procedures and welding operations in accordance with AWS "Qualification" requirements.

C. Welders to have current certificates, If re-certification of welders is required, re-testing will be Contractor's responsibility.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site at such intervals to ensure uninterrupted progress or work. Store on site only in authorized locations.

B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not to delay work.

C. Store materials to permit easy access for inspection and identification. Keep steel members off ground. Protect steel members and packaged materials from exposure to the weather.

PART 2 PRODUCTS

2.1 MATERIALS

A. Misc. structural shapes, plates, etc...: ASTM A 36

B. Structural beams, columns, etc...: ASTM A36 or ASTM A992 GR.50 - Refer to structural drawings.

C. Hot-formed steel tubing: ASTM A 501

D. Steel pipe: ASTM A53, Type E or S, Grade B; or ASTM A501

E. Anchor bolts: ASTM A 307, non-headed type, with nuts and washers.

F. Unfinished threaded fasteners: ASTM A 307, Grade A, regular low-carbon steel bolts, nuts, and washers. Provide hexagonal heads.

G. High strength threaded fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, complying with ASTM A325.

H. Electrodes for welding: Comply with AWS Code. Use E70XX electrodes.

I. Grout: non-shrink, non-metallic, flowable or plastic with minimum of 7,000 psi at 28 days in accordance with CRD-C 621, Army Corps of Engineers.

2.2 FABRICATION

A. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Properly mark-match materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.

B. Work shall be executed by skilled workmen under experienced supervision.

C. Connections: Weld or bolt shop connections.

D. Bolt field connections with high-strength bolts, except where welded connections are indicated.

E. Field verify all existing dimensions and elevations prior to fabrication.

F. High strength bolted construction: Install high strength threaded fasteners in accordance with AISC "Specifications for Structural Joints Using ASTM A 325 Bolts". Use bearing type bolts with threads included in shear plane.

G. Welded construction: Comply with AWS Code for procedures, appearance, and quality of welds, and methods used in correcting welding work.

H. Holes for other work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on final shop drawings.

2.3 SHOP PAINTING

A. General: Shop paint all structural steel, except anchor bolts and surfaces to be field welded.

B. Paint all members after fabrication, except where surfaces would be inaccessible for surface prep and painting.

C. Apply paint in sufficient volume or coats to provide a minimum dry film thickness of 3 but not more than 5 mils.

D. Surface preparation: Clean steel in accordance with Steel Structures Painting Council (SSPC - SP3 Power Tool Cleaning).

2.4 SOURCE QUALITY CONTROL

A. General: Materials and fabrication procedures are subject to inspections at tests in mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

B. Promptly remove and replace materials or fabricated components that do not comply.

PART 3 EXECUTION

3.1 ERECTION

A. Must conform to the applicable provisions of AISC specifications.

B. Temporary planking: Provide temporary planking and working platforms as necessary to effectively complete work.

C. Setting bases and bearing plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.

D. All anchor bolts shall be built into connections work in advance.

E. Set loose and attached base plates and bearing plates for structural members on leveling nuts. Do not use wedges of shims.

F. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding cut off flush with edge of base or bearing plate prior to packing with grout.

G. Field assembly: Set structural frame accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

H. All bolts, including anchor bolts, shall have enough projection to expose not less than 1-1/2 threads after nuts is tightened. Level and plumb individual members of structure within specified AISC tolerances.

I. If steel is damaged or does not fit-up, Contractor shall submit proposed corrective measures for review by Engineer.

J. Do not enlarge unfair holes in members by burning or by using drift pins. Drill or ream holes that must be enlarged to accommodate next larger fastener, where possible.

K. The use of a gas cutting torch in field for correcting fabrication errors in primary structural members will not be permitted.

L. Immediately after erection, clean field welds, bolted connections, and abraded areas where shop coat was damaged. Spot and prime areas using same material as used for shop coat.

M. Set all members so that, in their final location, level, plumbness and alignment are within the tolerances prescribed by AISC Code.

3.2 QUALITY CONTROL

A. An independent testing and inspection agency shall be retained to inspect structural steel members high strength bolted connections and welded connections.

B. Testing agency shall conduct and interpret tests, state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom. Submit 3 copies of each report to Owner's representative.

C. Provide access for testing agency to places where structural steel work is begin fabricated or produced so that required inspection and testing can be accomplished.

D. Minimum required testing:

1. Visually inspect all structural steel beams, columns, etc.
2. Visually inspect all bolted and welded connections.
3. Test all beam or column splices.
4. Test a representative sample of all full or partial penetration welds.

E. Correct deficiencies in structural steel work that inspections have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expenses, as necessary to reconfirm any non-compliance of original work and to show compliance of corrected work.

3.3 FINAL CLEANUP

A. All temporary guys, braces, falswork, cribbing, rubbish and other debris are to be removed upon completion of erection.

END OF SECTION

SECTION 05 3100 - STEEL DECK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications Sections, apply to this section.

1.2 DESCRIPTION

A. SCOPE OF WORK

1. This section includes fabrication, delivery, unload and store in locations directed and erect all roof deck units as shown on drawings and specified.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification section.

B. Product data including manufacturer's specifications and installation instructions for each type of decking and accessories.

C. Shop drawings showing layout and type of deck units, anchorage details, and conditions requiring closure strips, supplementary framing, sump pans, cant strips, cut openings, special jointing, and other accessories.

D. Submitted shop drawings must be checked and signed by the General Contractor.

E. Welder certificate: See Section 051223 for certification submittal requirement.

1.4 QUALITY ASSURANCE

A. Codes and standards: Comply with provisions of the following Codes and Standards, except as otherwise indicated:

1. American Iron and Steel Institute (AISI), "Specification for the Design of Cold-Formed Steel Structural Members".

2. American Welding Society (AWS), D1.3 "Structural Welding Code - Sheet Steel".

3. Steel Deck Institute (SDI), "Design Manual for Composite Decks, Form Decks and Roof Decks".

B. Qualification of field welding: Use qualified welding processes and welding operators in accordance with "Welder Qualifications" procedures of AWS. Welded decking in place is subject to inspection and testing.

C. FM listing: Provide steel roof deck units that have been evaluated by Factory Mutual System and are listed in "Factory Mutual Approval Guide" for "Class I" fire-rated construction.

D. See Structural Steel 051223 for testing requirements.

PART 2 PRODUCTS

2.1 PRODUCTS

A. Roof deck to be 1-1/2 inch deep, 22 gauge, wide rib (Type B) with galvanized finish. Minimum properties are as follows. Computation of properties shall reflect the "Effective Compress Flange Width" concept.

22 Gauge
I = 0.169 in.^(4)
S_p = 0.189 in.^(3)
S_n = 0.192 in.^(3)
Maximum live load deflection = l/240 of span.
Maximum working stress = 20 ksi

B. Floor deck to be 9/16 inches deep, 26 gauge, galvanized permanent form deck. Minimum properties are as follows:
26 Gauge
I = 0.015 in.^(4)
S_p = 0.043 in.^(3)
S_n = 0.043 in.^(3)

C. Floor form deck to be 9/16 inches deep, 24 gauge, type C galvanized permanent non-composite form deck. Minimum properties are as follows:
24 Gauge
I = 0.019 in.^(4)
S_p = 0.057 in.^(3)
S_n = 0.057 in.^(3)

2.2 MANUFACTURERS

A. Available manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to the following:

1. Marlyn Steel Products, Inc.
2. Vulcraft Div., Nucor Corporation

2.3 MATERIALS

A. Steel for galvanized metal deck units: A653 Grade 33 with coating designation G90.

B. Miscellaneous steel shapes: ASTM A 36.

C. Sheet metal accessories: ASTM A 924, galvanized, G90.

D. Galvanizing repair: Where galvanized surfaces are damaged, prepare surfaces and repair in accordance with procedures specified in ASTM A 780.

E. Flexible closure strips: Manufacturer's standard mineral fiber closures.

F. Metal deck and sheet metal coating designation:

1. With structural concrete or insulating concrete topping – G90
2. Without structural concrete or insulating concrete topping – G60

2.4 FABRICATION

A. General: Form deck units in lengths to span three or more supports, with flush, telescoped, or nested 2-inch laps at ends and interlocking or nested side laps, of metal thickness, depth, and width as indicated.

B. Roof deck units: Provide deck configurations that comply with SDI “Specification and Commentary for Steel Roof Deck".

C. Roof sump pans: Fabricate from single piece of 0.071 inch min. (14 gauge) galvanized sheet steel with level bottoms and sloping sides to direct water flow to draining. Provide sump pans of adequate size to receive roof drains and with bearing flanges not less than 3 inches wide.

Recess pans not less than 1-1/2 inches below roof deck surfaces unless otherwise shown or required by deck configuration. Holes for drains will be cut in the field by others.

PART 3 EXECUTION

3.1 GENERAL

A. Delivery and storage: Deliver deck to job site in bundles and store off ground with one end elevated for water drainage. Cover with waterproof covering, ventilated to avoid condensation.

3.2 INSTALLATION

A. General: Install deck units and accessories in accordance with manufacturer's recommendations, shop drawings, and as specified herein.

B. Place deck units on supporting steel framework and adjust to final position with end accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.

C. Align deck units for entire length of run of cells and with close alignment between cells at ends of abutting units.

D. Place deck units flat and square, secured to adjacent framing without warp or deflection.

E. Suspended ceiling, light fixtures, ductwork, piling or other utilities shall not be suspended from decking.

F. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.

G. Fasten roof deck to supporting steel by welding. See drawings for weld pattern.

H. Comply with AWS requirements and procedures for manual shielded metal arc weld, appearance and quality of welds, and methods used in correcting welded work. Minimum puddle welded size = 5/8 inch diameter.

I. Use care in selecting electrodes and amperage to provide positive weld and to prevent blow-out holes.

J. Use welding washers for all decking 24 gage or thinner.

K. Mechanically fasten side laps of adjacent deck units between supports with No. 10 self-tapping machine screws.

L. Uplift loading: Install and anchor roof deck units to resist gross uplift loading. See plan for uplift loading requirements.

M. Cutting and fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking, as shown.

N. Reinforcement at openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work shown.

O. Roof sump pans: Place over openings provided in roof decking and weld to top decking surface. Space weld not more than 12 inches o.c. with at least one weld at each corner. Detail on architectural drawings.

P. Closure strips: Provide metal closure strips at open uncovered ends and edges of roof decking and in voids between decking and other construction. Weld into position to provide a complete decking installation.

Q. Touch-up painting: After decking installation, wire brush, clean, and paint scarred areas, welds, and rust spots on top and bottom surfaces of decking units and supporting steel members.

R. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.

END OF SECTION

SECTION 05 4000 - COLD-FORMED METAL FRAMING

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 this section.

1.2 SUMMARY

A. This section includes some or all of the following:

1. Exterior load-bearing wall framing.
2. Interior load-bearing wall framing.
3. Exterior non-load-bearing curtain-wall framing.
4. Floor joist framing.
5. Roof trusses.
6. Roof rafter framing.
7. Ceiling joist framing.
8. Shear walls.

1.3 DEFINITIONS

A. Minimum Uncoated Steel Thickness: Minimum uncoated thickness of cold-formed framing delivered to the project site shall be not less than 95 percent of the thickness used in the cold-formed framing design. Lesser thicknesses shall be permitted at bends due to cold forming.

B. Producer: Entity that produces steel sheet coil fabricated into cold-formed members.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing members, connectors, and fasteners capable of withstanding design loads within limits and under conditions indicated on the structural drawings.

1. Deflection Limits: Design framing systems to withstand the specific design loads without deflections greater than the following:
   a. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/600 of the wall height.
   b. Interior Load-Bearing Wall Framing: Horizontal deflection of 1/360 of the wall height.
   c. Exterior Non-Load-Bearing Curtain-Wall Framing: Horizontal deflection of 1/600 of the wall height.
   d. Floor Joist Framing: Vertical deflection of 1/360 of the span.
   e. Roof Trusses: Vertical deflection:
      1) total load = 1/240 of the span
      2) live load= 1/360 of the span
   f. Ceiling Joist Framing: Vertical deflection
      1) total load = 1/360 of the span
      2) live load = 1/480 of the span

2. Design framing systems to provide for movement of framing members 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 degrees F (67 degrees C)

B. Design exterior non-load-bearing curtain-wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

C. Design roof trusses according to AISI's "Design Guide for Cold-Formed Steel Trusses."

1.5 SUBMITTALS

A. Product Data: For each type of cold-formed metal framing product and accessory indicated.

B. Shop Drawings: Show layout, spacing, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

1. Contractor shall retain a licensed (delegated) professional engineer, experienced in the design of light gauge framing, to design all work described in this section and prepare shop drawings.

2. Shop drawing submittals shall be signed/sealed by the delegated engineer and shall include calculations when required.

C. Mill certificates signed by steel sheet producer, or test reports from a qualified independent testing agency, indicating steel sheet complies with requirements.

D. Welding Certificates: Copies of certificates for welding procedures and personnel.

E. Fastener Test Reports: From a qualified testing agency indicating that each of the following fasteners comply with requirements, based on comprehensive testing of current products:

1. Expansion anchors.

2. Power-actuated anchors.

3. Self-drilling screws.

4. Miscellaneous mechanical fasteners.

F. Research/Evaluation Reports: Evidence of cold-formed metal framing's compliance with building code in effect for project, from a model code organization acceptable to authorities having jurisdiction.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installed who has completed cold-formed metal framing 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.

B. Engineering Responsibility: The contractor shall retain a qualified professional (delegated) engineer to prepare design calculations, shop drawings, connection details, and other structural data.

C. Delegated 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 installation of cold-formed metal framing that are similar to those indicated for this project in material, design and extent.

D. Mill certificates signed by steel sheet producer, or test reports from a qualified independent testing agency indicating steel sheet complies with requirements, including uncoated steel thickness, yield strength, tensile strength, total elongation, chemical requirements, ductility, and galvanized-coating thickness.

E. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

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. Fire-Test-Response Characteristics: Where metal framing is part of a fire-resistance-rated assembly, provide framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by GA File Numbers in GA-600, "Fire Resistance Design Manual," or by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.

H. AISI Specifications: Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members" or "Load Resistance Factory Design Specification for Cold-Formed Steel Structural Members" and the following for calculating structural characteristics of cold-formed metal framing:

1. CCFSS Technical Bulletin: "AISI Specification Provisions for Screw Connections."

I. Comply with HUD's "Prescriptive Method for Residential Cold-Formed Steel Framing".

J. Pre-installation Conference: Conduct conference at project site to comply with requirements in Division 1 Section "Project Meetings".

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the work include, but are not limited to, the following:

1. Clark Steel Framing Industries
2. Dale Industries, Inc.
3. Dietrich Industries, Inc.
4. The Steel Network, Inc.
5. Unimast, Inc.
6. United Metal Products, Inc.

B. Connector Manufacturer: Subject to compliance with requirements, provide cold-formed metal framing connectors by The Steel Network, Inc. or approved equivalent.

2.2 MATERIALS

A. Steel Sheet: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Framing
   a. Grade: 33
   b. Coating: G60

2. Connectors
   a. Grade: 50, Class 1 or 2
   b. Grade: 50, Class 1 or 2 (See 2.03A)
   c. Coating: G90

B. Steel Studs: Manufacturer's standard C-shaped steel studs and joists, of web depths indicated, punched, with stiffened flanges, complying with ASTM C 955.

1. Minimum Uncoated-Steel Thickness: 0.0329 inch

2. Flange Width: 1-5/8 inches

C. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, complying with ASTM C 955, and as follows:

1. Minimum Uncoated Steel Thickness: Matching steel studs.

2. Flange Width: 1-1/4 inches (32 mm)

D. Connector Devices: By The Steel Network, Inc. or approved equivalent.

2.3 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi (230 MPa) for studs 20 gauge (33 mils) and lighter, minimum yield strength of 50,000 psi (340 MPa) for studs 18ga (43 mils) and heavier.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing

2. Web stiffeners

3. End clips

4. Foundation clips

5. Gusset plates

6. Stud kickers, knee braces and girts

7. End closures

8. Hole reinforcing plates

9. Backer plates

2.4 ANCHORS AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

D. Power-Actuated Fastening Systems: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

E. Mechanical Fasteners: Corrosion-resistant-coated, self-drilling, self-threading steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding electrodes: comply with AWS standards.

2.5 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A 780.

B. Cement Grout: Portland cement, ASTM C 150, 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, Non-shrink Grout: Premixed, nonmetallic, non-corrosive, non-staining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.

2.6 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to manufacturer's written recommendations 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 metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing is not permitted.

a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

b. Locate mechanical fasteners and install as designed by the specialty engineer and according to shop drawings, with screw penetrating jointed members by not less than three exposed screw threads.

4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to shop drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies 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. 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 metal framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Grout bearing surfaces uniform and level to ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction.

3.3 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing according to ASTM C 1007, unless more stringent requirements are indicated.

C. Install shop or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Bolt or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joists with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch (1.6 mm).

D. Install cold-formed metal framing and accessories plumb, square, and true-to-line, and with connections securely fastened, according to manufacturer's written recommendations and requirements in this section.

1. Cut framing members by sawing or shearing; do not torch cut.

2. Fasten cold-formed framing members by welding or screw fastening, as standard with fabricator. Wire typing of framing members is not permitted.

a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

b. Locate mechanical fasteners and install as designed by the specialty engineer according to shop drawings, with screw penetrating joined members by not less than three exposed screw threads.

E. Install framing members in one-piece lengths, unless splice connections are indicated on signed/sealed shop drawings.

F. Install temporary bracing and supports to secure framing and support loads comparable in intensity 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 and control joints with cold-formed metal framing. Independently frame both sides of joints.

H. Install insulation in built-up exterior framing 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 standard punched openings.

J. Erection Tolerances: Install cold-formed metal 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.

3.4 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, as shown on signed/sealed shop drawings.

1. Spacing: 16 inches on center maximum.

B. Squarely seat studs against webs of top and bottom tracks. Fasten both flanges of studs to top and bottom tracks. Space studs as shown on signed/sealed shop drawings.

C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar configurations.

D. Align studs vertically where wall-framing continuity is interrupted by floor framing. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Align floor and roof framing over studs. 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 as indicated.

G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. 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 as indicated on shop drawings.

2. Install runner 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 48 inches on center maximum or the dimension indicated on shop drawings apart. Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, BridgeBar™ BB mechanically fastened to webs of punched studs with BridgeClip by The Steel Network, Inc. or approved equivalent.

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 NON-LOAD-BEARING CURTAIN-WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track, unless otherwise noted. Space studs as follows:

1. Stud Spacing: 24 inches maximum, but refer to architectural wall system requirements for smaller spacing if required.

C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Mechanically fasten vertical deflection clips to bypassing studs and anchor to primary building structure.

E. Install horizontal bridging in curtain-wall studs, spaced in rows indicated on shop drawings but not more than 48 inches (1370 mm) apart. Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, BridgeBar™ BB mechanically fastened to webs of punched studs with BridgeClip by The Steel Network, Inc. or approved equivalent.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable curtain-wall-framing system.

3.6 JOIST INSTALLATION

A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on shop drawings.

B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.

1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm).

2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on shop drawings.

C. Space joists not more than 2 inches (51 mm) from abutting walls, and as follows:

1. Joist Spacing: 16 inches on center or as indicated on signed/sealed shop drawings.

D. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists if indicated.

E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated on shop drawings.

1. Install web stiffeners to transfer axial loads of walls above.

F. Install bridging at each end of joists and at intervals indicated on shop drawings. Fasten bridging at each joist intersection as follows:

1. Bridging: Cold-rolled steel channel, mechanically fastened to bottom flange of joists with BridgeClip by The Steel Network, Inc. or approved equivalent.

G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.

H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.7 TRUSS INSTALLATION

A. Install, bridge, and brace trusses according to shop drawings and requirements in this section.

B. Truss Spacing: as indicated on signed/sealed shop drawings.

C. Do not alter, cut, or remove framing members or connections of trusses.

D. Erect trusses with plane of truss webs plumb and parallel to each other, align, and accurately position at spacings indicated.

E. Erect trusses without damaging framing members or connections.

F. Align webs of bottom chords and load-bearing studs or continuously reinforce track to transfer loads to structure. Anchor trusses securely at all bearing points.

G. Install continuous bridging and permanently brace trusses as indicated on shop drawings.

3.8 FIELD QUALITY CONTROL

A. Testing: A qualified independent testing agency shall be retained to perform field quality-control testing.

B. Field and shop welds will be subject to inspection and testing.

C. Testing agency will report test results promptly and in writing to contractor, engineer and architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional testing and inspecting, at contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.9 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Touchup Painting: Wire brush, clean, and paint scarred areas, welds, and rust spots on fabricated and installed prime-painted, cold-formed metal framing. Paint framing surfaces with same type of shop paint used on adjacent surfaces.

C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensure cold-formed metal framing is without damage or deterioration at time of substantial completion.

END OF SECTION

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rooftop equipment bases and support curbs
2. Wood blocking [,cants,] and nailers.
3. Wood furring [and grounds].
4. Plywood backing panels.

1.2 ACTION SUBMITTALS

A. Product Data:

1. For each type of process and factory-fabricated product.
2. For preservative-treated wood products.

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates:

1. For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.

B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Engineered wood products.
4. Power-driven fasteners.
5. Metal framing anchors.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content:

1. Boards: 15 percent.
2. Dimension Lumber:15 percent unless otherwise indicated.

2.2 PRESERVATIVE TREATMENT

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

2.3 MISCELLANEOUS LUMBER

A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.

5. Furring.
6. Grounds.

B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.

C. Concealed Boards: 15 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine or southern pine; No. [2] [3] grade; SPIB.
2. Eastern softwoods; No. [2] [3] Common grade; NeLMA.

2.4 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1,Exterior, A-C, fire-retardant treated, in thickness indicated or, if not indicated, not less than3/4-inch nominal thickness.

2.5 FASTENERS

A. General: Fasteners are to be of size and type indicated and comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners[with hot-dip zinc coating complying with ASTM A153/A153M or ASTM F2329] [of Type 304 stainless steel].

B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

C. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC), and the Florida Building Code. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
2. ICC-ES evaluation report for fastener.

3.2 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes **wet enough that moisture content exceeds that specified**, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

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 Sections:

I. Division 06 Section "Rough Carpentry" for dimension lumber items associated with structural glued-laminated timber.

2. Division 05 Section "Steel Decking" for steel decking.

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 PERFORMANCE REQUIREMENTS

A. 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.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

I. 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. LEED Submittals:

1. Certificates for Credit MR 7: Chain-of-custody certificates certifying that wood used for structural glued-laminated timber complies with forest certification requirements. Include evidence that manufacturer is certified for chain of custody . by an FSC-accredited certification body.

a. Include statement indicating costs for each certified wood product.

2. Product Data for Credit EQ 4.4: For laminating adhesive used for structural glued-laminated timber, indicating that product contains no urea formaldehyde.

C. Shop Drawings:

1. Show layout of structural glued-laminated timber system and full dimensions of each member.

2. Indicate species and laminating combination, adhesive type, and other variables in required work.

3. Include large-scale details of connections.

D. Samples: Full width and depth, 24 inches 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.

E. Certificates of Conformance: Issued by a qualified testing and inspecting agency indicating that structural glued-laminated timber complies with requirements in AITC A190.1.

F. Material Certificates: For preservative-treated wood products, from manufacturer. Indicate type of preservative used and net amount of preservative retained.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide factory-glued structural units produced by an AITC- or APA-licensed firm that is certified for chain of custody by an FSC-accredited certification body.

1. Factory mark each piece of structural glued-laminated timber with AITC Quality Mark or APA-EWS trademark. Place mark on surfaces that will not be exposed in the completed Work.

B. Quality Standard: Comply with AITC A190.1.

1.7 Forest Certification: Provide structural glued-laminated timber 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."

1.8 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with provisions in AITC I1 I.

B. Individually wrap members using plastic-coated paper covering with water-resistant seams.

PART 2 - **PRODUCTS**

2.1 STRUCTURAL GLUED-LAMINA TED TIMBER

A. General: Provide structural glued-laminated timber that complies with AITC 117 or research/evaluation reports acceptable to authorities having jurisdiction.

1. Provide structural glued-laminated timber made from single species.

2. Provide structural glued-laminated timber made from solid lumber laminations; do not use laminated veneer lumber.
3. Provide structural glued-laminated timber made with wet-use adhesive complying with AITC A190.1.
   a. Use adhesive that contains no urea-formaldehyde resins.

B. Species and Grades for Structural Glued-Laminated Timber: Southern pine, 24F-V5, balanced lay up.

C. Appearance Grade: Premium, complying with AITC 110.
   1. For Premium appearance grades, fill voids as required by AITC 110. For Premium appearance grade, use clear wood inserts, of matching grain and color, for filling voids and knot holes more than 1/4 inch wide.

D. Preservative Treatment after Fabrication: Where preservative-treated structural glued- laminated timber is indicated, pressure treat after fabrication according to AWPA C28.
   I. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
   2. Use preservative solution without water repellents or substances that might interfere with application of indicated finishes.
   3. Do not incise structural glued-laminated timber.

E. 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.

F. Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer that is compatible with indicated finish.

2.2 TIMBER CONNECTORS

A. General: Unless otherwise indicated, fabricate from the following materials:
   1. Stainless-steel plate and flat bars complying with ASTM A 666, Type 316.
   2. Stainless-steel bars and shapes complying with ASTM A 276, Type 316.
   3. Stainless-steel sheet complying with ASTM A 666, Type 316.

B. Fabricate beam seats from stainless steel with bearing plates as required and as indicated on Drawings.

C. Fabricate tie rods, if any, from round steel bars with upset threads connected with forged-steel turnbuckles complying with ASTM A 668, unless otherwise indicated.

D. Provide bolts, 3/4 inch unless otherwise indicated, complying with ASTM A 307, Grade A; nuts complying with ASTM A 563; and, where indicated, flat washers.

E. Provide shear plates, as required, as indicated on Drawings, and complying with ASTM D 5933.

2.3 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 I:I slope with either circular or parabolic camber equal to 1/500 of span.

C. 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 IO minutes.

D. Seal Coat: After fabricating, sanding, and end-coat sealing, apply a heavy saturation coat of penetrating sealer on surfaces of each unit.

2.4 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.

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 structural glued-laminated timber.

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. Lift with padded slings and protect comers with wood blocking.

2. Install structural glued-laminated timber to comply with Shop Drawings.

3. Install timber connectors as indicated.

B. Cutting: Avoid cutting after fabrication. Where field fitting is unavoidable, comply with requirements for_ shop fabrication.

1. 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.

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 specified in Division 09. 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 071800 - TRAFFIC COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes traffic coatings[and pavement markings] for the following applications:

1. Vehicular traffic.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include installation instructions and details, material descriptions, dry or wet film thickness requirements, and finish.

B. Shop Drawings: For traffic coatings.

1. Include details for treating substrate joints and cracks, flashings, deck penetrations, and other termination conditions that are not included in manufacturer's product data.

C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Sample warranty.

1.5 QUALITY ASSURANCE

1. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer

2. References General: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section.

3. ASTM International (ASTM): www.astm.org:1.ASTM C920 - Standard Specification for Elastomeric Joint Sealants
4. ASTM C1127 - Standard Guide for Use of High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with an Integral Wearing Surface
5. ASTM C1193 - Standard Guide for Use of Joint Sealants4. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coatinge
6. ASTM D4259 - Standard Practice for Abrading Concret6. CSA S413 for Parking Structures7. ASTM C957 - Standard Specification for High-Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane With Integral Wearing Surface
7. International Concrete Repair Institute (ICRI): www.icri.org:1. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair

1.6 Warranty Period: Ten years from date of Substantial Completion.Applicator: Company specializing in performing the work of this section qualified by system manufacturer for warranted membrane installation. Applicator shall submit the following certification for review:

A. Applicator shall submit documentation from the membrane manufacturer to verify contractor’s status as a qualified approved applicator for warranted installations.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which traffic coating manufacturer agrees to furnish traffic coating material to repair or replace those materials installed according to manufacturer's written instructions that exhibit material defects or otherwise fail to perform as specified under normal use within warranty period specified.

C. Access for Repair: Owner shall provide unimpeded access to the Project and the traffic coating system for purposes of testing, leak investigation, and repair,Cost Limitation: Manufacturer's obligation for repair or replacement shall be limited to the original installed cost of the work.

D. Special warranties specified in this article exclude deterioration or failure of traffic coating materials from the following:

1. Movement of the structure caused by structural settlement or stresses on the traffic coating exceeding manufacturer's written specifications for elongation.

2. Mechanical damage caused by outside agents
3. E.1.An authorized full-time technical employee of the manufacturer.
4. 2. An independent party certified as a waterproofing inspector acceptable to Architect, retained by the Contractor.

5. Testing Agency Qualifications: Qualified independent agency experienced in the installation of the specified waterproofing system, and qualified to perform observation and inspection specified in Field Quality Control Article to determine Installer’s compliance with the requirements of this Project, acceptable to Architect, retained by the Contractor.

6. Waterproofing Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified waterproofing system, qualified to perform observation and inspection specified in Field Quality Control Article, to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Inspector shall be one of the following:

    a. An authorized full-time technical employee of the manufacturer.
    b. An independent party certified as a waterproofing inspector acceptable to Architect, retained by the Contractor.
    c. Mockups: Provide waterproofing mockup application within mockups required in other sections, or if not specified, in an area of not less than 90 sq. ft. of surface where directed by Architect for each type of substrate condition. Include examples of surface preparation, crack and joint treatment, waterproofing application, and flashing, transition, and termination conditions, to set quality standards for execution.

7. Mockups: Provide waterproofing mockup application within mockups required in other sections, or if not specified, in an area of not less than 90 sq. ft. of surface where directed by Architect for each type of substrate condition. Include examples of surface preparation, crack and joint treatment, waterproofing application, and flashing, transition, and termination conditions, to set quality standards for execution.Include intersection of deck waterproofing with adjacent vertical waterproofing and moisture control system.If applicable, include no less than 13 ft (3.96m) including a minimum of one splice joint of Willseal®Expansion Joint System.

1.7 REFERENCES

A. A. References, General: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. B. ASTM International (ASTM): www.astm.org:

1. ASTM C920 - Standard Specification for Elastomeric Joint Sealants

2. ASTM C1127 - Standard Guide for Use of High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with an Integral Wearing Surface

3. ASTM C1193 - Standard Guide for Use of Joint Sealants

4. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coatin

5. ASTM D4259 - Standard Practice for Abrading Concrete

6. 6. CSA S413 for Parking Structures

7. ASTM C957 - Standard Specification for High-Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane With Integral Wearing Surface C. International Concrete Repair Institute (ICRI): www.icri.org: ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair

1.8 PERFORMANCE REQUIREMENTS

A. Material Compatibility: Provide primers; base coat, intermediate coat, and topcoat; and accessory 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.Waterproofing Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified waterproofing system, qualified to perform observation and inspection specified in Field Quality Control Article, to determine Installer’s compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Inspector shall be one of the following:

1. An authorized full-time technical employee of the manufacturer.
2. An independent party certified as a waterproofing inspector acceptable to Architect, retained by the Contractor.

1.9 TRAFFIC COATING

A. Traffic Coating: Manufacturer's standard, traffic-bearing, seamless, high-solids-content, cold liquid-applied, elastomeric, water-resistant membrane system with integral wearing surface for vehicular traffic and equipment-room floor service condition; according to ASTM C957/C957M.

1. Tremco Traffic Coatings Vulkem EWS Vehicular PUMA

2.

3.

4. PART 2-PRODUCTS

5. 2.1 TRAFFIC COATING

B. A. Traffic Coating: Manufacturer's standard, traffic-bearing, seamless, high-solids-content, cold liquid-applied, elastomeric, water-resistant membrane system with integral wearing surface for vehicular traffic and equipment-room floor service condition; according to ASTM C957/C957M.

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

b. |Sherwin-Williams Company (The).
c. Tremco Incorporated.

2. Tremco Traffic Coatings Vulkem EWS Vehicular PUMA
3. TRAFFIC COATING FOR VEHICULAR TRAFFIC, EXTREME WEAR SYSTEM (EWS)

a. Traffic Coating: Manufacturer's polyurethane methyl methacrylate system for extreme exterior exposure conditions, traffic-bearing, seamless, high-solids-content, cold liquid-applied, elastomeric, waterproofing membrane system with integral wearing surface for vehicular traffic.
b. Primer: Two-component, chemically curing methyl methacrylate
c. Base Coats: Polyurethane methacrylate, Tremco PUMA BC or Tremco PUMA B C LM
d. Wear Coat: Polyurethane methacrylate, Tremco PUMA WC mixed with tremco PUMA Filler Powder.
e. Top Coat: Methyl Methacrylate

1) Tremco PUMA TC

2) Color: As selected by Architect from manufacturer's full range.
3) Aggregate: Manufacturer's standard aggregate for each use indicated of particle sizes, shape, and minimum hardness recommended in writing by traffic-coating manufacturer.
4) 30-50 Mesh silica sand for the primer
5) 16-30 Mesh silica sand for the wear coa1. Tremco PUMA WC mixed with Tremco PUMA Filler Powder

4. 1. Tremco PUMA BC or Tremco PUMA B C LM1. Tremco PUMA Pr imer1. Basis of Design Products: Tremco, Inc., Vulkem EWS Vehicular System.
5. **ACCESSORY MATERIALS**
6. A. General: Accessory materials as described in manufacturer's written installation instructions, recommended to produce complete traffic coating system meeting performance requirements, and compatible with traffic coating material and adjacent materials.
7.
8. B. Initiator; Benzoyl Peroxide
9.
10. 1. Tremco PUMA Initiator
11.
12. C. Cleaner; One component methyl methacrylate
13.
14. 1. Tremco PUMA Cleaner
15.
16. D. Crack and Joint Detailing Coating
17.
18. 1. Tremco PUMA BC LM and/or Tremco PUMA WC with silica
19.
20. E. Vertical and Ramp Application Coating
21.

1. Tremco PUMA BC R

F. Cant Beads and Detailing of Penetrations

1. Tremco PUMA BC T

G. Expansion Joint Pre-compressed or Closed Cell, Monolithic Foam System. Foam Structure Must not Contain Unbonded Foam Laminations;

1. Willseal® 250 for use in both vehicular and pedestrian traffic applications.

2. Willseal® 250-R for use in both vehicular and pedestrian traffic applications requiring additional point load resistance.

3. Willseal® Color Coreseal – CM for use in both vehicular and pedestrian traffic applications requiring +/-25% movement capability, closed cell, and a lightweight seal with an integrated waterproofing membrane. For vertical applications refer to Color Coreseal – V.

4. Willseal® FR-H - for use in both vehicular and pedestrian traffic applications requiring hourly fire rated systems. For vertical applications refer to Willseal® FR-V.

5. Willseal®approved accessory sealants as per Willseal application instructions

PART 3 - EXECUTION

3.1 EXAMINATION

A. Surface Condition: Before applying traffic coating materials and system accessories, examine substrate and conditions to ensure substrates are fully cured, smooth, and free from high spots,depressions, loose and foreign particles and other deterrents to adhesion, and conditions comply with manufacturer's written recommendations.

1. Verify concrete surfaces are visibly dry, have cured for time period recommended by traffic coating manufacturer, and are free from release agents, curing agents, laitance, and other contaminates

2. Test surfaces following cleaning and abrasion specified below.

a. Test for capillary moisture by method recommended in writing by traffic-coating manufacturer.

b. Test for traffic coating adhesion per manufacturer's recommended method.

c. Notify Architect in writing of unsatisfactory condition

3. Proceed with installation once unsatisfactory conditions have been corrected.Clean and prepare substrates according to ASTM C1127 and manufacturer's written instructions to produce clean, dust-free, dry substrate for traffic-coating application.

4. Application of coating indicates acceptance of surfaces and conditions.

C. Schedule preparation work so dust and other contaminants from process do not fall on wet, newly coated surfaces.

D. Concrete Substrates: **Mechanically abrade surface to a uniform profile acceptable to manufacturer, according to ASTM D4259.** Do not acid etch.

1. Remove grease, oil, paints, and other penetrating contaminants from concrete.
2. Remove concrete fins, ridges, and other projections.
3. Remove laitance, glaze, efflorescence, curing compounds, concrete hardeners, form-release agents, and other incompatible materials that might affect coating adhesion.
4. Mechanically abrade concrete surfaces by method of shot blasting to a uniform profile in accordance with ASTM D4259 and meeting ICRI Surface Profile CSP Do not acid etch.
5. Protect adjacent surfaces by masking. Mask termination points on verticla surfaces. Protect weepholes and drains
6. maining loose material to provide a sound surface, and clean surfaces according to ASTM D4258.
7. Provide manufacturer's written report accepting preparation pior to application of coating.

1.10 TERMINATIONS AND PENETRATIONS

A. Prepare vertical and horizontal surfaces at terminations and penetrations through traffic coatings and at expansion joints, drains, and sleeves according to ASTM C1127 and manufacturer's written instructions.

B. Provide sealant cants at penetrations and at reinforced and nonreinforced, deck-to-wall butt joints.

C. Terminate edges of deck-to-deck expansion joints with preparatory base-coat strip.

D. Install sheet flashings at deck-to-wall expansion and dynamic joints, and bond to deck and wall substrates according to manufacturer's written recommendations.

1.11 JOINT AND CRACK TREATMENT

A. Prepare, treat, rout, and fill joints and cracks in substrates according to ASTM C1127 and manufacturer's written recommendations. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D4258.

1. Comply with recommendations in ASTM C1193 for joint-sealant installation.

B. Apply reinforcing strip in traffic-coating system where recommended in writing by traffic-coating manufacturer.

1.12 PAVEMENT MARKINGS

A. Do not apply pavement-marking paint for striping and other markings until layout, colors, and placement have been verified with Architect and traffic coating has cured.

B. Sweep and clean surface to eliminate loose material and dust.

C. Apply pavement-marking paint with mechanical equipment to produce markings of dimensions indicated with uniform straight edges. Apply at manufacturer's recommended rates for a minimum wet-film thickness of 15-mils.

1.13 PROTECTING AND CLEANING

A. Protect traffic coatings from damage and wear during remainder of construction period.

B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Graphite-polystyrene foam-plastic board insulation.

PART 2 - PRODUCTS
EXECUTION

2.1 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

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. Install insulation with manufacturer's R-value label exposed after insulation is installed.

D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

2.2 INSTALLATION OF SLAB INSULATION

A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.

1. If not otherwise indicated, extend insulation a minimum of [24 inches] [36 inches] <**Insert dimension**> below exterior grade line.

B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

1. If not otherwise indicated, extend insulation a minimum of [24 inches] [36 inches] <**Insert dimension**> in from exterior walls.

2.3 INSTALLATION OF FOUNDATION WALL INSULATION

A. Butt panels together for tight fit.

B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors.

C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

2.4 INSTALLATION OF CAVITY-WALL INSULATION

A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer.

1. Fit courses of insulation between[**wall ties and other**] obstructions, with edges butted tightly in both directions, and with faces flush.
2. Press units firmly against inside substrates.
3. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 042000 "Unit Masonry."

2.5 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
6. For wood-framed construction, install blankets according to ASTM C1320 and as follows:

    a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.

7. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.

    a. Exterior Walls: Set units with facing placed toward [**exterior of construction**] [**interior of construction**] [**as indicated on Drawings**].
    b. Interior Walls: Set units with facing placed [**as indicated on Drawings**] [**toward areas of high humidity**] <**Insert location**>.

2.6 INSTALLATION OF CURTAIN-WALL INSULATION

A. Install board insulation in curtain-wall construction according to curtain-wall 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 without touching spandrel glass. Maintain cavity width of dimension indicated on Drawings between insulation and glass.
2. Install insulation to fit snugly without bowing.

END OF SECTION

SECTION 072119 - FOAMED-IN-PLACE INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Spray polyurethane foam.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Research reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 SPRAY POLYURETHANE FOAM

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. C.P. Chemical Co., Inc.: "Tripolymer CMU Foam-in-Place Insulation.
   b. Tailored Chemical Products, Inc.: Core-Fill 500.
   c. Thermal Corporation of America: Thermco Foam Insulation.

2. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

   a. Flame-Spread Index: 5 maximum.
   b. Smoke-Developed Index: 5 maximum.

c. Fuel contributed: 0.

3. Fire Propagation Characteristics: Passes NFPA 285 and NFPA 276 testing as part of an approved assembly.

a. Fire Hour Rating as indicated on the drawings per ASTM E-119.

4. Combustion Characteristics: Non-combustible, Class A when tested in accordance with ASTM E 84.

B. Thermal Values:

1. Minimum aged R-value at 1-inch (25.4-mm) thickness of 4.9 at 32 deg per ASTM C 177.
2. Sound abatement: Minimum STC rating of 52 per ASTM E 90.
3. Shrinkage: Less than 2%.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Spray insulation to envelop entire area to be insulated and fill voids.

C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.

END OF SECTION

SECTION 072413 - POLYMER-BASED EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1.2 EIFS-clad barrier-wall assemblies that are field applied over substrate.It is intended that the system match existing conditions.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each EIFS component, trim, and accessory.

B. Samples: For each exposed product and for each color and texture specified.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturer certificates.

B. Product certificates.

C. Product test reports.

D. Field quality-control reports.

E. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An installer who is certified in writing by AWCI International as qualified to install Class PB EIFS using trained workers.

1.8 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace components of EIFS 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 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Dryvit Systems, Inc.
2. Parex USA, Inc.
3. Sto Corp.

2.2 PERFORMANCE REQUIREMENTS

A. EIFS Performance: Comply with ASTM E 2568 and with the following:

1. Weathertightness: Resistant to water penetration from exterior.
2. Impact Performance: ASTM E 2568,**High** impact resistance **unless otherwise indicated**.

2.3 EIFS MATERIALS

A. Flexible-Membrane Flashing: Cold-applied, self-adhering, self-healing, rubberized-asphalt and polyethylene-film composite sheet or tape and primer; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer.

B. Insulation Adhesive: EIFS manufacturer's standard formulation designed for indicated use; compatible with substrate.

1. Adhesives shall have a VOC content of 50 g/L or less.

C. Molded, (Expanded) Rigid Cellular Polystyrene Board Insulation: Comply with ASTM E 2430/E 2430M.

1. Foam Buildouts: Provide with profiles and dimensions indicated on Drawings.

D. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multi-end strands with retained mesh tensile strength of not less than 120 lbf/in. according to ASTM E 2098/E 2098M.

1. Reinforcing Mesh for EIFS, General: Not less than weight required to comply with impact-performance level specified in "Performance Requirements" Article.

E. Base Coat: EIFS manufacturer's standard mixture.

1. Adhesives shall have a VOC content of 50 g/L or less.

F. Water-Resistant Base Coat: EIFS manufacturer's standard waterproof formulation.

1. Adhesives shall have a VOC content of 50 g/L or less.

G. Primer: EIFS manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.

1. VOC Content: 250 g/L or less.

H. Finish Coat: EIFS manufacturer's standard acrylic-based coating with enhanced mildew resistance.

1. Colors:MAtch existing..
2. Textures: Match existing.

I. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with EIFS manufacturer's written instructions; manufactured from UV-stabilized PVC; and complying with ASTM D 1784 and ASTM C 1063.

PART 3 - EXECUTION

3.1 EIFS INSTALLATION

A. Comply with ASTM C 1397, ASTM E 2511, and EIFS manufacturer's written instructions for installation of EIFS as applicable to each type of substrate.

B. Flexible-Membrane Flashing: Apply and lap to shed water; seal at openings, penetrations, and terminations. Prime substrates with flashing primer if required and install flashing.

C. Trim: Apply trim accessories at perimeter of EIFS, at expansion joints,[at windowsills,] and elsewhere as indicated. Coordinate with installation of insulation.

D. Board Insulation: Adhesively attach insulation to substrate in compliance with ASTM C 1397.

1. Rasp or sand flush entire surface of insulation to remove irregularities projecting more than 1/32 inch from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than 1/16 inch. Prevent airborne dispersal and immediately collect insulation raspings or sandings.
2. Coordinate installation of flashing and insulation to produce wall assembly that does not allow water to penetrate behind flashing and EIFS lamina.

E. Expansion Joints: Install at locations indicated and where required by EIFS manufacturer.

F. Water-Resistant Base Coat: Apply full-thickness coverage to exposed insulation and to other surfaces indicated on Drawings.

G. Base Coat: Apply full coverage to exposed insulation and foam buildouts with not less than 1/16-inch dry-coat thickness.

H. Reinforcing Mesh: Embed reinforcing mesh in wet base coat to produce wrinkle-free installation with mesh continuous at corners, overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C 1397. Do not lap reinforcing mesh within 8 inches of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are invisible.

I. Double-Layer Reinforcing-Mesh Application: Where indicated or required, apply second base coat and second layer of reinforcing mesh, overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C 1397 in same manner as first application. Do not apply until first base coat has cured.

J. Additional Reinforcing Mesh: Apply strip-reinforcing mesh around openings, extending 4 inches beyond perimeter. Apply additional 9-by-12-inch strip-reinforcing mesh diagonally at corners of openings (re-entrant corners). Apply 8-inch- wide, strip-reinforcing mesh at both inside and outside corners unless base layer of mesh is lapped not less than 4 inches on each side of corners.

K. Foam Buildouts: Fully embed reinforcing mesh in base coat.

L. Finish Coat: Apply full-thickness coverage over dry primed base coat, maintaining a wet edge at all times for uniform appearance, to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.

M. Sealer Coat: Apply over dry finish coat, in number of coats and thickness required by EIFS manufacturer.

3.2 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform.

B. EIFS Tests and Inspections: According to ASTM E 2568 .

C. EIFS will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION

SECTION 072419 - WATER-DRAINAGE EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. EIFS-clad drainage-wall assemblies that are field applied over substrate.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1.3 ACTION SUBMITTALS

A. Product Data: For each EIFS component, trim, and accessory, including water-resistive barrier coatings.

B. Shop Drawings:

1. Include details for EIFS buildouts.
2. Include details for parapet cap flashing.

C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer certificates.

B. Product certificates.

C. Product test reports.

D. Field quality-control reports.

E. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An installer who is certified in writing by AWCI International as qualified to install Class PB EIFS using trained workers.

1.7 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace components of EIFS-clad drainage-wall assemblies that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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. Dryvit Systems, Inc..
2. Parex USA, Inc..
3. Sto Corp.

2.2 PERFORMANCE REQUIREMENTS

A. EIFS Performance: Comply with ASTM E 2568 and with the following:

1. Weathertightness: Resistant to uncontrolled water penetration from exterior, with a means to drain water entering EIFS to the exterior.
2. Impact Performance: ASTM E 2568, [**High** impact resistance.
3. Drainage Efficiency: 90 percent average minimum when tested according to ASTM E 2273.

2.3 EIFS MATERIALS

A. Water-Resistive Barrier Coating: EIFS manufacturer's standard formulation and accessories for use as water-resistive barrier coating; compatible with substrate.

1. Water-Resistance: Comply with physical and performance criteria of ASTM E 2570/E 2570M.
2. VOC Content: 100 g/L or less.

3. Low-Emitting Materials: Coatings shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Flexible-Membrane Flashing: Cold-applied, self-adhering, self-healing, rubberized-asphalt, and polyethylene-film composite sheet or tape and primer; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer.

C. Insulation Adhesive: EIFS manufacturer's standard formulation designed for indicated use; [specifically formulated to be applied to back side of insulation in a manner that creates open vertical channels designed to serve as an integral part of the water-drainage system of the EIFS-clad drainage-wall assembly;]compatible with substrate.

1. Adhesives shall have a VOC content of 50 g/L or less.
2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Molded, (Expanded) Rigid Cellular Polystyrene Board Insulation: Comply with ASTM E 2430/E 2430M.

1. Foam Buildouts: Provide with profiles and dimensions indicated on Drawings.

E. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. according to ASTM E 2098/E 2098M.

F. Base Coat: EIFS manufacturer's standard mixture.

1. Adhesives shall have a VOC content of 50 g/L or less.

G. Water-Resistant Base Coat: EIFS manufacturer's standard water-resistant formulation.

1. Adhesives shall have a VOC content of 50g/L or less.

H. Primer: EIFS manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.

1. VOC Content: 100 g/L or less.

I. Finish Coat: EIFS manufacturer's standard acrylic-based coating with enhanced mildew resistance.

1. Colors:Match Existing.
2. Textures:Match existing.

J. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with EIFS manufacturer's written instructions; manufactured from UV-stabilized PVC; and complying with ASTM D 1784, manufacturer's standard cell class for use intended, and ASTM C 1063.

PART 3 - EXECUTION

3.1 EIFS INSTALLATION

A. Comply with ASTM C 1397, ASTM E 2511, and EIFS manufacturer's written instructions for installation of EIFS as applicable to each type of substrate indicated.

B. Water-Resistive Barrier Coating: Apply over **existing substrate**> to provide a water-resistive barrier.

C. Flexible-Membrane Flashing: Install over water-resistive barrier coating, applied and lapped to shed water; seal at openings, penetrations, and terminations. Prime substrates with flashing primer if required and install flashing.

D. Trim: Apply trim accessories at perimeter of EIFS, at expansion joints,[at windowsills,] and elsewhere as indicated. Coordinate with installation of insulation.

E. Board Insulation: Adhesively attach insulation to substrate in compliance with ASTM C 1397.

1. Apply adhesive to insulation by notched-trowel method, with notches oriented vertically to produce drainage channels that remain functional after the insulation is adhered to substrate.
2. Rasp or sand flush entire surface of insulation to remove irregularities projecting more than 1/32 inch from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than 1/16 inch. Prevent airborne dispersal and immediately collect insulation raspings or sandings.
3. Coordinate installation of flashing and insulation to produce wall assembly that does not allow water to penetrate behind flashing and water-resistive barrier coating.

F. Expansion Joints: Install at locations indicated, where required by EIFS manufacturer.

G. Water-Resistant Base Coat: Apply full-thickness coverage to exposed insulation other surfaces indicated on Drawings.

H. Reinforcing Mesh: Embed reinforcing mesh in wet base coat to produce wrinkle-free installation with mesh continuous at corners, overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C 1397. Do not lap reinforcing mesh within 8 inches of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are invisible.

I. Double-Layer Reinforcing-Mesh Application: Where indicated or required, apply second base coat and second layer of reinforcing mesh, overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C 1397 in same manner as first application. Do not apply until first base coat has cured.

J. Additional Reinforcing Mesh: Apply strip-reinforcing mesh around openings, extending 4 inches beyond perimeter. Apply additional 9-by-12-inch strip-reinforcing mesh diagonally at corners of openings (re-entrant corners). Apply 8-inch- wide, strip-reinforcing mesh at both inside and outside corners unless base layer of mesh is lapped not less than 4 inches on each side of corners.

K. Foam Buildouts: Fully embed reinforcing mesh in base coat.

L. Double Base-Coat Application: Where indicated, apply second base coat in same manner and thickness as first application, except without reinforcing mesh. Do not apply until first base coat has cured.

M. Finish Coat: Apply full-thickness coverage over dry [**primed**]base coat, maintaining a wet edge at all times for uniform appearance, to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.

N. Sealer Coat: Apply over dry finish coat, in number of coats and thickness required by EIFS manufacturer.

3.2 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform.

B. EIFS Tests and Inspections: According to ASTM E 2359/E 2359M <Insert tests and inspections>.

C. EIFS will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 072419

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SECTION 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Vapor-permeable, fluid-applied air barriers.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For air-barrier assemblies.

1. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.

1.4 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Product test reports.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Mockups: Build mockups to set quality standards for materials and execution.

1. Build integrated mockups of exterior wall assembly , 150 sq. ft., incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.

2. Coordinate construction of mockups to permit inspection and testing of air barrier before external insulation and cladding are installed.Include junction with roofing membrane, and building corner condition.

PART 2 - PRODUCTS

2.1

2.2 MATERIALS

A. VOC Content: 250 g/L or less.

2.3 PERFORMANCE REQUIREMENTS

A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction to be capable of performing as a continuous air barrier **and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration**. Air-barrier assemblies to be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E2357.

2.4 HIGH-BUILD AIR BARRIERS, VAPOR PERMEABLE

A. High-Build, Vapor-Permeable Air Barrier Modified Bituminous Type: Modified Bituminous membrane with an installed dry film thickness, according to manufacturer's written instructions, of 35 mils or thicker over smooth, void-free substrates.

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. W.R. Grace, Perm-A-Barrier VP (BASIS OF DESIGN)

b. Henry Company.

B. Physical and Performance Properties:

1. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E2178.
2. Vapor Permeance: Minimum not less than 11.2 perms; ASTM E96/E96M, Dessicant Method, Procedure A, Desiccant Method.
3. Ultimate Elongation: Minimum 200 percent; ASTM D412, Die C.

4. Adhesion to Substrate: Minimum 30 lbf/sq. in. when tested according to ASTM D4541.
5. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
6. UV Resistance: Can be exposed to sunlight for 90 days according to manufacturer's written instructions.

2.5 ACCESSORY MATERIALS

A. Requirement: Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.

D. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

E. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

F. Bridge **isolation joints**, **expansion joints**, **and**discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

3.2 INSTALLATION

A. Install accessory materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.

1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.

B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

C. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply **transition strip** so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames.

D. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

E. High-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply air-barrier material in full contact around protrusions such as masonry ties.

1. Vapor-Permeable, High-Build Air Barrier: Total dry film thickness [as recommended in writing by manufacturer to comply with performance requirements, but not less than 35 mils, applied in one or more equal coats.

F. Do not cover air barrier until it has been tested and inspected by testing agency.

G. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Tests: As determined by testing agency from among the following tests:

1. Air-barrier dry film thickneRetain "Air-Leakage-Location Testing" Subparagraph below if testing to locate air-leakage sites is required and if air-leakage-volume testing is required.

2. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate according to ASTM D4541 for each [600 sq. ft.] <Insert value> of installed air barrier or part thereof.

C. Air barriers will be considered defective if they do not pass tests and inspections.

1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
2. Remove and replace deficient air-barrier components for retesting as specified above.

D. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

E. Prepare test and inspection reports.

3.4 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

END OF SECTION 072726

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SECTION 074113.13 - FORMED METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Standing seam metal roof panels and associated insulation, underlayment, cover board, gutters and downspouts to match existing construction..

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.

C. Samples: For each type of metal panel indicated.

D. Calculations: Include signed and sealed calculations for roof attachment fasteners, signed and sealed by a Florida Registered Professional Engineer.

E. Florida Product Approval Number: Submit certificate of compliance.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Warranty Period:20 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 panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period:20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Energy Performance:

1. Provide roof panels that are listed on the EPA/DOE's ENERGY STAR "Roof Product List" for [**low**] [**steep**]-slope roof products.
2. Provide roof panels according to one of the following when tested according to CRRC-1:

   a. Three-year, aged solar reflectance of not less than **0.55** and emissivity of not less than **0.75**.
   b. Three-year, aged Solar Reflectance Index of not less than **64**when calculated according to ASTM E1980.

B. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: **As indicated on Drawings**.
3. Deflection Limits: For wind loads, As indicated on Drawings.

C. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E1680 at the following test-pressure difference:

1. Test-Pressure Difference:6.24 lbf/sq. ft.

D. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E1646 at the following test-pressure difference:

1. Test-Pressure Difference:6.24 lbf/sq. ft..

E. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E2140.

F. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating:**UL 90**.

G. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.

1. Fire/Windstorm Classification: Class 1A-**120**.
2. Hail Resistance: **SH**.

H. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. 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**.

2.2 EXPOSED-FASTENER, LAP-SEAM, METAL ROOF PANELS

A. Corrugated-Profile, Exposed-Fastener Metal Roof Panels: Formed with alternating curved ribs

B. across width of panel.

1. Aluminum Sheet: Coil-coated sheet, ASTM B209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

a. Thickness:0.032 in..
b. Surface:match existing finish.
c. Exterior Finish:Three-coat fluoropolymer.
d. Color: Match existing.

2. Panel Coverage:Match existing.

3. Panel Height: match existing..Manufacturers: It is the intention to match existing metal roof panels. 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. BEMO-USA - Basis of Design.
    b. Merchant & Evans
    c. Metecno-Morin; Division of Metecno, Inc.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils to 40 mils thick, specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 220 deg F; ASTM D1970.
2. 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. Carlisle WIP Products; a brand of Carlisle Construction Materialsc.-CCW WIP 300HT.
    b. GCP Applied Technologies Inc.-Ultra.
    c. Henry Company-Blueskin PE 200HT..
    d. Owens Corning WeatherLock Metal High Temperature Underlayment.

2.4 MISCELLANEOUS MATERIALS

A. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal 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 crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

B. Flashing and Trim: Provide flashing and trim formed from same material as metal panels 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 panels.

C. Gutters and Downspouts: Formed from same material as roof panels according to SMACNA's "Architectural Sheet Metal Manual." Finish gutters to match [metal roof panels] [roof fascia and rake trim].

D. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C920; as recommended in writing by metal panel manufacturer.

E. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311

F. COVER BOARDS

1. Glass mat Gypsum Sheathing Board: ASTM C1177.
2. Type and Thickness: Regular, 1/4".
3. Product: Subject to compliance with requirements, provide Densglas by Georgia Pacific Corporation.
4. Cover board fasteners: Factory coated stainless steel fasteners and metal or plastic plates complying with corrsion-resistance provisions in FMG 4470, designed for fastening substrate board to substrate.

G. PLYWOOD SHEATHING AT CANOPY

1. Plywood: DOC PS 1, preservative treated. Roof sheathing shall be Exterior Structural 1 sheathing, not less than 1/2" thick.
2. Preservative Treatment by Process: AWPA C9. Preservative chemicals shall be accepatable to the authorities having jurisdiction, and containing no arsenic or chromium. Mark plywood with appropriate classification marking of an inspection agency acceptable to the suthorities having jurisdiction. Treat plywood used with roofing.
3. Bituminous Coating: Cold applied asphalt mastic, SSPC-Paint 12, compounded for 15 mil dry film thickness per coat. Provide inert type non-corrosive compound free of asbestos fibes, sulphur components and other deleterious impurities.

H. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C920; as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.5 FABRICATION

A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Comply with SMACNA Architectural Sheet Metal Manual

E. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

2.6 FINISHES

A. Panels and Accessories:

1. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat.

PART 3 - EXECUTION

3.1 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.2 INSTALLATION OF UNDERLAYMENT

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. Apply over the entire roof surface.
2. Apply over the roof area indicated below:

    a. Valleys, from lowest point to highest point, for a distance on each side of 18 inches minimum. Overlap ends of sheets not less than 6 inches.

B. Slip Sheet: Apply slip sheet over underlayment before installing metal roof panels.

C. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

3.3 INSTALLATION OF METAL ROOF PANELS

A. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
3. Flash and seal panels with weather closures at perimeter of all openings.
4. Watertight Installation:

    a. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
    b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
    c. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

B. Accessory Installation: 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 panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended in writing by metal panel manufacturer.

C. 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. Install work with laps, joints, and seams that are permanently watertight.

3.4 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION

SECTION 074213.19 - INSULATED 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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Foamed-insulation-core metal wall panels.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.

C. Samples: For each type of metal panel indicated.

1.5 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Warranties: Samples of special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. 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 panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 72:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: **As indicated on Drawing**.
3. Deflection Limits: As indicated on Drawing.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft. .

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft. .

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. 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**.

E. Fire-Test-Response Characteristics: Provide metal wall panels and system components with the following fire-test-response characteristics, as determined by testing identical panels and system components per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

1. Fire-Resistance Characteristics: Provide materials and construction tested for fire resistance per ASTM E 119.
2. Radiant Heat Exposure: No ignition when tested according to NFPA 268.
3. Potential Heat: Acceptable level when tested according to NFPA 259.
4. Surface-Burning Characteristics: Provide wall panels with a flame-spread index of 25 or less and a smoke-developed index of 450 or less, per ASTM E 84.

2.2 FOAMED-INSULATION-CORE METAL WALL PANELS

A. General: Provide factory-formed and -assembled metal wall panels fabricated from two metal facing sheets and insulation core foamed in place during fabrication, and with joints between panels designed to form weathertight seals. Include accessories required for weathertight installation.

1. Insulation Core: Modified isocyanurate or polyurethane foam using a non-CFC blowing agent, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively.

a. Closed-Cell Content: 90 percent when tested according to ASTM D 6226.

B. Exposed-Fastener, Foamed-Insulation-Core Metal Wall Panels : Formed with a raised, trapezoidal major rib at panel edge and two intermediate stiffening ribs symmetrically spaced between major rib and panel edge; designed for lapping side edges of adjacent panels and mechanically attaching to supports using exposed fasteners in side laps

1. Basis-of-Design Product: The design intention os to matche existing wall panels. Subject to compliance with requirements, provide CENTRIA Architectural Systems with Duraguard Plus finish or comparable product by one of the following:

a. Insulated Panel Systems (IP) Metecno Panel Systems, Inc..
b. Metl-Span

2. Aluminum Sheet: Fabricate panel with exterior and interior facings of same material and thickness. Provide facings of aluminum coil-coated sheet, ASTM B 209 , alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

a. Thickness: 0.032 inch.
b. Surface: Smooth, flat finish.
c. Exterior Finish:Three-coat fluoropolyme.

1) Color:match existing.

d. Interior Finish: Siliconized polyester.

1) Color: match existing.

3. Core Material:Manufacturers' standard fire retardant core..
4. Clips: Manufacturer's standard one piece, formed from stainless steel.
5. Gaskets: Extruded, dry seal silicone.
6. Sealant: Manufacturer's standard silicone.
7. Panel Thickness: Match existing.

C. Shiplap-Edge, Laminated-Insulation-Core Metal Wall Panels: Formed with flush exterior panel facing and with shiplap edges; designed for sequential installation by mechanically attaching panels to supports using concealed clips and fasteners; with factory-applied [sealant] [gaskets] in side laps.

1. Aluminum Sheet: Fabricate panel with exterior and interior facings of same material and thickness. Provide facings of aluminum coil-coated sheet, ASTM B 209 , alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

1) Color:Match existing.

a. Polyisocyanurate Insulation: Closed cell, modified polyisocyanurate foam using a non-CFC blowing agent, board type, with a maximum flame-spread index of 25 and a smoke-developed index of 450.

1) Closed-Cell Content: 90 percent when tested according to ASTM D 6226.

2. Edge Members: Extruded aluminum, not less than 0.063-inch wall thickness.
3. Gaskets: Extruded, dry seal silicone.
4. Panel Thickness: match existing.
5. Thermal-Resistance Value (R-Value): according to ASTM C 1363.

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal 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 crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch wide and 1/8 inch thick.

2.4 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. 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 panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

2.5 FINISHES

A. Panels and Accessories:

1. Three-Coat Fluoropolymer: 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.
2. 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 .

PART 3 - EXECUTION

3.1 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.2 INSULATED METAL WALL PANEL INSTALLATION

A. General: Apply continuous ribbon of sealant to panel joint on concealed side of insulated metal wall panels as vapor seal; apply sealant to panel joint on exposed side of panels for weather seal.

1. Fasten foamed-insulation-core metal wall panels to supports with fasteners at each lapped joint at location and spacing and with fasteners recommended by manufacturer.
2. Apply panels and associated items true to line for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
3. Provide metal-backed washers under heads of exposed fasteners on weather side of insulated metal wall panels.
4. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
5. Provide sealant tape at lapped joints of insulated metal wall panels and between panels and protruding equipment, vents, and accessories.
6. Apply a continuous ribbon of sealant tape to panel side laps and elsewhere as needed to make panels weathertight.
7. Apply snap-on battens to exposed-fastener, insulated-core metal wall panel seams to conceal fasteners.

B. Foamed-Insulation-Core Metal Wall Panels: Fasten metal wall panels to supports with concealed clips at each joint at location and spacing and with fasteners recommended by manufacturer. Fully engage tongue and groove of adjacent panels.

1. Install clips to supports with self-tapping fasteners.

C. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

D. 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. Install work with laps, joints, and seams that are permanently watertight.

3.3 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 074213.19

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SECTION 074293 - SOFFIT PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal soffit panels to match existing.

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: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.

C. Samples: For each type of metal panel indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. 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 panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: **As indicated on Drawings**.
3. Deflection Limits: For wind loads, no greater than **1/180**of the span.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference:6.24 lbf/sq. ft.].

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. 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**.

2.2 METAL SOFFIT PANELS

A. Provide 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 in side laps. Include accessories required for weathertight installation.

B. Metal Soffit Panels: Match profile and material of metal existing soffit panels.

1. Finish: Match finish and color of metal wall panels existing soffit panels.
2. Sealant: Factory applied within interlocking joint.

C. Flush-Profile Metal Soffit Panels: Match existing Solid and/or Perforated panels formed with vertical panel edges; with flush joint between panels.

1. Manufacturers: It is intended to mach existing soffit panels. 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. Merchant and Evans.
    b. BEMO, USA
    c. Metecno-Morin Division of Metecno, Inc.

2.3 FABRICATION

A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

1. Soffit Framing: Wire tie[**or clip**] furring channels to supports[**, as required to comply with requirements for assemblies indicated**].

3.2 INSTALLATION

A. Watertight Installation:

1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

B. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

3.3 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION

SECTION 075423 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Adhered thermoplastic polyolefin (TPO) roofing system.
2. Accessory roofing materials.
3. Substrate board.
4. Roof insulation.
5. Insulation accessories and cover board.
6. Asphalt materials.
7. Walkways.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For insulation and roof system component fasteners, include copy of FM Approvals' RoofNav listing.

B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:

1. Layout and thickness of insulation.
2. Base flashings and membrane termination details.
3. Flashing details at penetrations.
4. Tapered insulation layout, thickness, and slopes.
5. Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened roofing system.
6. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
7. Tie-in with adjoining air barrier.

C. Samples: For the following products:

1. Roof membrane and flashings, of color required.
2. Walkway pads or rolls, of color required.

D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer Certificates:

1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

   a. Submit evidence of compliance with performance requirements.

2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

B. Product Test Reports: For roof membrane and insulation, for tests performed by a qualified testing agency, indicating compliance with specified requirements.

C. Field Test Reports:

1. Concrete internal relative humidity test reports.
2. Fastener-pullout test results and manufacturer's revised requirements for fastener patterns.

D. Field quality-control reports.

E. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Certified statement from existing roof membrane manufacturer stating that existing roof warranty has not been affected by Work performed under this Section.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturers: A qualified manufacturer that is UL listed and/or listed in FM Approvals' RoofNav for roofing system identical to that used for this Project.
2. Installers: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Warranty Period:20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accelerated Weathering: Roof to withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.

B. Impact Resistance: Roof membrane to resist impact damage when tested according to ASTM D3746, ASTM D4272, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.

C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:

1. Zone 1 (Roof Area Field):Refer to Structural Drawings.
2. Zone 2 (Roof Area Perimeter):Refer to Structural Drawings..

a. Location: From roof edge to inside roof edge. Refer to Structural Drawings.

3. Zone 3 (Roof Area Corners): Refer to Structural Drawings..

a. Location: Refer to Structural Drawingsfor direction from building corner.

D. FM Approvals' RoofNav Listing: Roof membrane, base flashings, and component materials comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and are listed in FM Approvals' RoofNav for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals Certification markings.

1. Fire/Windstorm Classification:**Class 1A-120**.
2. Hail-Resistance Rating: FM Global Property Loss Prevention Data Sheet 1-34 **SH**.

E. SPRI's Directory of Roof Assemblies Listing: Roof membrane, base flashings, and component materials comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and are listed in SPRI's Directory of Roof Assemblies for roof assembly identical for that specified for this Project.

F. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.

G. ENERGY STAR Listing: Roofing system to be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for**low** slope roof products.

H. Energy Performance: Roofing system to have an initial solar reflectance of not less than **0.70** and an emissivity of not less than **0.75** when tested in accordance with ANSI/CRRC S100.

I. Exterior Fire-Test Exposure: ASTM E108 or UL 790, **Class A**; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

J. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.2 THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

A. TPO Sheet: ASTM D6878/D6878M, internally fabric- or scrim-reinforced, self-adhering TPO sheet.

1. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

   a. Carlisle SynTec Incorporated.
   b. Firestone Building Products.
   c. GAF.

2. Thickness:60 mils, nominal.
3. Exposed Face Color:White.

2.3 ACCESSORY ROOFING MATERIALS

A. General: Accessory materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.

1. Adhesive and Sealants: Comply with VOC limits of authorities having jurisdiction.

B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing,55 mils thick, minimum, of same color as TPO sheet.

C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.

D. Bonding Adhesive: Manufacturer's standard[, water based.

E. Slip Sheet:Manufacturer's standard, of thickness required for application.

F. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

G. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.

H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.4 SUBSTRATE BOARD

A. Gypsum Board Type X: ASTM C1396/C1396M.

1. Thickness: 5/8 inch.

B. Glass-Mat Gypsum Roof Substrate Board: ASTM C1177/C1177M, water-resistant gypsum board.

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. Certainteed; SAINT-GOBAIN.
b. Georgia-Pacific Gypsum LLC.
c. National Gypsum Company.
d. USG Corporation.

2. Thickness: Type X, 5/8 inch thick.
3. Surface Finish: Unprimed.

C. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

2.5 ROOF INSULATION

A. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.

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. Atlas Roofing Corporation - Polyiso.

b. Carlisle SynTec Incorporated.
c. Certainteed; SAINT-GOBAIN.
d. Firestone Building Products.
e. GAF.

2. Size: 48 by 96 inches.
3. Thickness:

a. Base Layer: 1-1/2 inches.
b. Upper Layer: Provide factory-tapered insulation boards fabriccated to a slope of 1/4inch per foot unless otherwise indicated.
c. Provide preformed saddles, crickets, tapered edge strips and other insulation shapes as necessary. Fabricate to slopes indicated.

B. Tapered Insulation: Provide factory-tapered insulation boards.

1. Minimum Thickness: 1/4 inch.
2. Slope:

a. Roof Field:1/4 inch per foot unless otherwise indicated on Drawings.
b. Saddles and Crickets: 1/2 inch per foot unless otherwise indicated on Drawings.

2.6 INSULATION ACCESSORIES AND COVER BOARD

A. Fasteners: Factory-coated steel fasteners with metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation[and cover boards] to substrate, and acceptable to roofing system manufacturer.

B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:

1. Modified asphaltic, asbestos-free, cold-applied adhesive.
2. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.
3. Full-spread, spray-applied, low-rise, two-component urethane adhesive.
4. Adhesives and sealants shall comply with the following limits for VOC content:

a. Plastic Foam Adhesives: 50 g/L.
b. Gypsum Board and Panel Adhesives: 50 g/L.
c. Multipurpose Construction Adhesives: 70 g/L.
d. Fiberglass Adhesives: 80 g/L.
e. Contact Adhesives: 80 g/L.
f. PVC Welding Compounds: 510 g/L.
g. Other Adhesives: 250 g/L.
h. Single-Ply Roof Membrane Sealants: 450 g/L.
i. Nonmembrane Roof Sealants: 300 g/L.
j. Sealant Primers for Nonporous Substrates: 250 g/L.
k. Sealant Primers for Porous Substrates: 775 g/L.

5. Adhesives and sealants shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Fiber-Reinforced Cementitious Cover Board: ASTM C1325, fiber-mat-reinforced cementitious board.

1. Thickness:5/8 inch.

D. Protection Mat: Woven or nonwoven polypropylene, polyolefin, or polyester fabric; water permeable and resistant to UV degradation; type and weight as recommended by roofing system manufacturer for application.

2.7 ASPHALT MATERIALS

A. Roofing Asphalt: [ASTM D312/D312M, Type III or Type IV] [ASTM D6152/D6152M, SEBS modified].

B. Asphalt Primer: ASTM D41/D41M.

2.8 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkwaypads or rolls, approximately 3/16 inch thick and acceptable to roofing system manufacturer.

1. Size: Approximately 36 by 60 inches.
2. Color: Contrasting with roof membrane.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
1. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
2. Verify that concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than **75** percent, or as recommended by roofing system manufacturer, when tested according to ASTM F2170.

a. Test Frequency: One test probe per each 1000 sq. ft, or portion thereof, of roof deck, with not less than three tests probes.
b. Submit test reports within 24 hours after performing tests.

3. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.
4. Verify that joints in precast concrete roof decks have been grouted flush with top of concrete.

3.2 PREPARATION

A. Perform fastener-pullout tests according to roof system manufacturer's written instructions.

1. Submit test result within 24 hours after performing tests.

a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.

3.3 INSTALLATION OF ROOFING, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions, **FM Approvals' RoofNav** listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning Work on adjoining roofing.

C. Install roof membrane and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition[**and to not void warranty for existing roofing system**].

3.4 INSTALLATION OF SUBSTRATE BOARD

3.5 INSTALLATION OF INSULATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.

B. Comply with roofing system and roof insulation manufacturer's written instructions for installing roof insulation.

C. Installation Over Metal Decking:

1. Install base layer of insulation with joints staggered not less than 24 inches in adjacent rows,and with long joints continuous at right angle to flutes of decking].

a. Locate end joints over crests of decking.
b. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

    1) Trim insulation so that water flow is unrestricted.

f. Fill gaps exceeding 1/4 inch with insulation.
g. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
h. Loosely lay base layer of insulation units over substrate.
i. Mechanically attach base layer of insulation and substrate board using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to metal decks.

    1) Fasten insulation according to requirements in FM Approvals' RoofNav for specified Windstorm Resistance Classification .
    2) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.

2. Install upper layers of insulation and tapered insulation with joints of each layer offset not less than 12 inches from previous layer of insulation.

    a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
    b. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
    c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

        1) Trim insulation so that water flow is unrestricted.

    f. Fill gaps exceeding 1/4 inch with insulation.
    g. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
    h. Loosely lay each layer of insulation units over substrate.

i. Adhere each layer of insulation to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

1) Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
2) Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
3) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

3.6 INSTALLATION OF COVER BOARDS

A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.

1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
2. At internal roof drains, conform to slope of drain sump.

a. Trim cover board so that water flow is unrestricted.

3. Cut and fit cover board tight to nailers, projections, and penetrationRetain first subparagraph below for loosely laid and ballasted roofing systems. Consult roof membrane manufacturer.
4. Adhere cover board to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classificationand FM Global Property Loss Prevention Data Sheet 1-29, as follows:

a. Set cover board in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

B. Install slip sheet over cover board and beneath roof membrane.

C. Place plates on insulation in required fastening patterns to achieve FM ratingand secure in accordance with manufacturer's instructions.

1. Install plates and fasteners tight and flat to substrate with no dimpling, and with fastener extending 1 inch minimum into roof deck; do not overdrive fasteners.

3.7 INSTALLATION OF ADHERED ROOF MEMBRANE

A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.

B. Unroll roof membrane and allow to relax before installing.

C. Start installation of roofing in presence of roofing system manufacturer's technical personnel **and Owner's testing and inspection agency**.

D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

E. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.

F. Hot Roofing Asphalt: Apply a solid mopping of hot roofing asphalt to substrate at temperature and rate required by manufacturer, and install fabric-backed roof membrane. Do not apply to splice area of roof membrane.

G. Fabric-Backed Roof Membrane Adhesive: Apply to substrate at rate required by manufacturer, and install fabric-backed roof membrane.

H. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.

I. Apply roof membrane with side laps shingled with slope of roof deck where possible.

J. Seams: Clean seam areas, overlap roof membrane, and hot-air weld side and end laps of roof membrane and sheet flashings, to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.

K. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.8 INSTALLATION OF BASE FLASHING

A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.9 INSTALLATION OF WALKWAYS

A. Flexible Walkways:

1. Install flexible walkways at the following locations:

   a. Perimeter of each rooftop unit.
   b. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
   c. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
   d. Top and bottom of each roof access ladder.
   e. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
   f. Locations indicated on Drawings.
   g. As required by roof membrane manufacturer's warranty requirements.

2. Provide 6-inch clearance between adjoining pads.
3. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.10 FIELD QUALITY CONTROL

A. Testing Agency:Engage a qualified testing agency to inspect substrate conditions, surface preparation, roof membrane application, sheet flashings, protection, and drainage components, and to furnish reports to Architect.

B. Perform the following tests:

1. Infrared Thermography: Testing agency surveys entire roof area using infrared color thermography according to ASTM C1153.

   a. Perform tests before overlying construction is placed.
   b. After infrared scan, locate specific areas of leaks by electrical capacitance/impedance testing or nuclear hydrogen detection testing.
   c. After testing, repair leaks, repeat tests, and make further repairs until roofing and flashing installations are watertight.

      1) Cost of retesting is Contractor's responsibility.

   d. Testing agency to prepare survey report of initial scan indicating locations of entrapped moisture, if any.

2. Electrical Capacitance/Impedance Testing: Testing agency surveys entire roof area for entrapped water within roof assembly according to ASTM D7954/D7954M.

    a. Perform tests before overlying construction is placed.
    b. After testing, repair leaks, repeat tests, and make further repairs until roofing and flashing installations are watertight.

        1) Cost of retesting is Contractor's responsibility.

    c. Testing agency to prepare survey report indicating locations of entrapped moisture, if any.

C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.

D. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

3.11 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing system, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075423

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SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, are to 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 are not to rattle, leak, or loosen, and are to remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with **NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual"** requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. SPRI Wind Design Standard: Manufacture and install **copings** tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:

1. Design Pressure: **As indicated on Drawings**.

D. FM Approvals Listing: Manufacture and install flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, **Class 1-120** . Identify materials with name of fabricator and design approved by FM Approvals.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F**, ambient;** 180 deg F**, material surfaces** .

2.2 FABRICATION, GENERAL

A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.

1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

2. 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.
3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances:

1. 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 indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
2. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard **and by FM Global Property Loss Prevention Data Sheet 1-49** for application, but not less than thickness of metal being secured.

G. Seams:

1. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
2. 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.**
3. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. **Rivet joints where necessary for strength.**

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.

1. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of **sealant**.
3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
8. Do not field cut sheet metal flashing and trim by torch.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of **uncoated-aluminum** sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

1. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
3. Use lapped expansion joints only where indicated on Drawings.

D. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

E. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated.

    a. Embed hooked flanges of joint members not less than 1 inch into sealant.
    b. Form joints to completely conceal sealant.
    c. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.
    d. Adjust setting proportionately for installation at higher ambient temperatures.

        1) Do not install sealant-type joints at temperatures below 40 deg F.

2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

F. Rivets: Rivet joints in **uncoated aluminum** where necessary for strength.

3.2 INSTALLATION OF ROOF-DRAINAGE SYSTEM

A. Install sheet metal roof-drainage items to produce complete roof-drainage system in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated on Drawings. Lap joints minimum of 4 inches in direction of water flow.

3.3 INSTALLATION OF ROOF FLASHINGS

A. Install sheet metal flashing and trim to comply with performance requirements**, sheet metal manufacturer's written installation instructions,** and cited sheet metal standard.

1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing:

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at **staggered** 3-inch centers.
3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.

C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless steel draw band and tighten.

3.4 INSTALLATION 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 indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.5 CLEANING

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.

3.6 PROTECTION

A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

B. 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, as determined by Architect.

END OF SECTION 076200

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SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copings.
2. Roof-edge specialties.
3. Roof-edge drainage systems.
4. Reglets and counterflashings.

B. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roof specialties.

1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.

C. Samples: For each type of roof specialty and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For tests performed by a qualified testing agency.

B. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are FM Approvals listed for specified class.

1.6 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties 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 Delta E units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
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 PERFORMANCE REQUIREMENTS

A. FM Approvals' Listing: Manufacture and install**copings roof-edge specialties** that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, C**lass 1-120**. Identify materials with FM Approvals' markings.

B. SPRI Wind Design Standard: Manufacture and install **copings**, **roof-edge specialties** tested according to SPRI ES-1 and capable of resisting the following design pressures:

1. Design Pressure: **As indicated on Drawings**.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. 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.

2.2 COPINGS

A. Metal Copings: Manufactured coping system consisting of metal coping cap in section lengths not exceeding 12 fee, concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching coping caps.

1. Manufacturers: available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Architectural Products Company.
b. ATAS International, Inc.
c. Berridge Manufacturing Company.
d. Castle Metal Products.
e. PAC-CLAD; Petersen Aluminum Corporation; a Carlisle company.
f.

2. Formed Aluminum Sheet Coping Caps: Aluminum sheet thickness as required to meet performance requirements.

a. Surface:Smooth, fla finish.
b. Finish:Three-coat fluoropolymer
c. Color:match existing..

2.3 REGLETS AND COUNTERFLASHINGS

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. Berridge Manufacturing Company.
2. Exceptional Metals.
3. Fry Reglet Corporation.
4. Heckmann Building Products, Inc.

B. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:

1. Formed Aluminum: 0.050 inch thick.

C. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches and in lengths not exceeding [12 feet] <Insert dimension> designed to snap into [reglets] [or] [through-wall-flashing receiver] and compress against base flashings with joints lapped, from the following exposed metal:

1. Formed Aluminum:0.032 inch thick.

D. Accessories:

1. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

E. Aluminum Finish:Three-coat fluoropolymer.

1. Color:match existing.

2.4 MATERIALS

A. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

2.5 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. 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. ATAS International, Inc.
   b. Carlisle WIP Products; a brand of Carlisle Construction Materials.
   c. GCP Applied Technologies Inc.
   d. Owens Corning.
   e. Protecto Wrap Company.

2. Thermal Stability: ASTM D1970/D1970M; stable after testing at 240 deg F.

2.6 MISCELLANEOUS MATERIALS

A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.

B. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

C. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

E. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.

PART 3 - EXECUTION

3.1 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply 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. Roll laps with roller. Cover underlayment within 14 days.

1. Apply continuously under copings, roof-edge specialties and reglets and counterflashings.
2. Coordinate application of self-adhering sheet underlayment under roof specialties with requirements for continuity with adjacent air barrier materials.

B. Slip Sheet: Install with tape or adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

3.2 INSTALLATION, GENERAL

A. Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

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**uncoated aluminum** roof specialties 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 specialties for waterproof performance.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise indicated on Drawings.
2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that penetrate**substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance** .

E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F

3.3 INSTALLATION OF COPING

A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's required spacing that meets performance requirements.
2. Interlock face-leg drip edge into continuous cleat anchored to substrate at manufacturer's required spacing that meets performance requirements. Anchor back leg of coping with screw fasteners and elastomeric washers at manufacturer's required spacing that meets performance requirements.

3.4 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 and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed.

END OF SECTION

SECTION 078100 - APPLIED FIRE PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sprayed fire-resistive materials.

1.2 DEFINITIONS

A. SFRM: Sprayed fire-resistive materials.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference atProject site.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Sprayed fire-resistive material.
2. Substrate primers.
3. Bonding agent.
4. Topcoat.

1.5 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Evaluation reports.

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by sprayed fire-resistive material manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Assemblies: Provide fire protection, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.

B. Fire-Resistance Design: Indicated on Drawings, tested according to**ASTM E119 or UL 263**; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Steel members are to be considered unrestrained unless specifically noted otherwise.

C. Asbestos: Provide products containing no detectable asbestos.

2.2 SPRAYED FIRE-RESISTIVE MATERIALS

A. Sprayed Fire-Resistive Material (refer to the drawings for the UL Design number): Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and applicationorconveyed in a dry state and mixed with atomized water at place of application].

1. Manufacturers: Subject to compliance with requirements,provide products by one of the following:

   a. Carboline Company; a subsidiary of RPM International.
   b. GCP Applied Technologies Inc.
   c. Isolatek International.
   d. Pyrok, Inc.
   e. Schundler Company (The).
   f. Southwest Fireproofing Products Co.

2. Application: Designated for exterior use by a qualified testing agency acceptable to authorities having jurisdiction.
3. Bond Strength: Minimum150-lbf/sq. ft. cohesive and adhesive strength based on field testing according to ASTM E736.
4. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E605, whichever is thicker, but not less than 0.375 inch.
5. Combustion Characteristics: ASTM E136.
6. Surface-Burning Characteristics: Comply with ASTM E84.

   a. Flame-Spread Index: 10 or less.
   b. Smoke-Developed Index:10or less.

7. Compressive Strength: Minimum [1400 lb/sq.ft. according to ASTM E761.
8. Corrosion Resistance: No evidence of corrosion according to ASTM E937.
9. Deflection: No cracking, spalling, or delamination according to ASTM E759.
10. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E760.
11. Air Erosion: Maximum weight loss of 0.025 g/sq. ftin 24 hours according to ASTM E859.
12. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result inno growth on specimens per ASTM G21.].

2.3 AUXILIARY MATERIALS

A. Provide auxiliary materials that are compatible with sprayed fire-resistive material and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.

B. Substrate Primers: Primers approved by sprayed fire-resistive material manufacturer for the required fire-resistance design.

C. Bonding Agent: Product approved by sprayed fire-resistive material manufacturer.

D. Topcoat: Suitable for application over sprayed fire-resistive material; of type recommended in writing by sprayed fire-resistive material manufacturer for each fire-resistance design.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design.

3.2 PREPARATION

A. Cover other work subject to damage from fallout or overspray of fire protection materials during application.

B. Prime substrates where included in fire-resistance design and where recommended in writing by sprayed fire-resistive material manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fire protection.

3.3 APPLICATION

A. Construct fire protection assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fire protection Work.

B. Comply with sprayed fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fire protection; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

C. Spray apply fire protection to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by sprayed fire-resistive material manufacturer.

D. Do not install enclosing or concealing construction until after sprayed fire-resistive material has been applied, inspected, and tested and corrections have been made to deficient applications.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Test and inspect as required by the IBC and FBC[, Subsection 1705.13, "Sprayed Fire-Resistant Materials.".

B. Fire protection will be considered defective if it does not pass tests and inspections.

1. Apply additional fire protection, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.

C. Prepare test and inspection reports.

3.5 CLEANING

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

3.6 REPAIRS

A. Repair fire protection damaged by other work before concealing it with other construction.

B. Repair fire protection by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 078100

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1.3 ACTION SUBMITTALS

A. Product data.

B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly developed in accordance with current International Firestop Council (IFC) guidelines. Obtain approval of authorities having jurisdiction prior to submittal.

1.4 INFORMATIONAL SUBMITTALS

A. Listed system designs.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Approvals according to FM Approvals 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

PART 2 - PPRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

   a. Penetration firestop systems installed with products bearing the classification marking of a qualified product certification agency in accordance with listed system designs published by a qualified testing agency.

      1) UL in its online directory "Product iQ."
      2) Intertek Group in its "Directory of Building Products."
      3) FM Approvals in its "Approval Guide."
      4) <**Insert name of qualified testing and inspecting agency**>.

2.2 PENETRATION FIRESTOPPING SYSTEMS

A. Description: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems are to be compatible with one another, with the substrates forming openings, and with penetrating items if any.

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. 3M Fire Protection Products.
   b. Hilti, Inc.
   c. International Fireproof Technology Inc.
   d. Tremco, Inc.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479.

1. F-Rating: Not less than the fire-resistance rating of the wall penetrated.
2. Membrane Penetrations: Install recessed fixtures such that the required fire resistance will not be reduced.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479.

1. F-Rating: At least one hour, but not less than the fire-resistance rating of the floor penetrated.
2. T-Rating: At least one hour, but not less than the fire-resistance rating of the floor. The following floor penetrations do not require a T-rating:

    a. Those within the cavity of a wall.

3. W-Rating: Provide penetration firestopping systems with a Class 1 W-rating in accordance with UL 1479.

D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.

1. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Formaldehyde emissions shall not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

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 system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

PART 3 - EXECUTION

3.1 INSTALLATION OF PENETRATION FIRESTOPPING SYSTEMS

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. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.

C. 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.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

D. Install fill materials by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
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.

3.2 IDENTIFICATION

A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.

1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.

B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. 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.

3.3 FIELD QUALITY CONTROL

A. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.

B. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

END OF SECTION

SECTION 078443 - JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.
2. Joints at exterior curtain-wall/floor intersections.
3. Joints in smoke barriers.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly developed in accordance with current International Firestop Council (IFC) guidelines.

1.4 INFORMATIONAL SUBMITTALS

A. Listed System Designs: For each joint firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Approvals according to FM Approvals 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:

   a. Joint firestop systems installed with products bearing the classification marking of a qualified product certification agency in accordance with Listed System Designs published by a qualified testing agency.

      1) UL in its online directory "Product iQ."
      2) Intertek Group in its "Directory of Building Products."

2.2 JOINT FIRESTOPPING SYSTEMS

A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems must accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

1. Provide products that, upon curing, do not re-emulsify, dissolve, leach, breakdown, or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture.
2. Provide firestop products that do not contain ethylene glycol.

B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E1966 or UL 2079.

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. 3M Fire Protection Products.
   b. CEMCO; California Expanded Metal Products Co.
   c. ClarkDietrich.
   d. Hilti, Inc.
   e. MarinoWARE.
   f. Owens Corning.
   g. ROCKWOOL.
   h. Tremco, Inc.

2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.

C. Joints in Smoke Barriers: Provide joint firestopping systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg.

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. 3M Fire Protection Products.
   b. Hilti, Inc.
   c. International Fireproof Technology Inc.
   d. MarinoWARE.
   e. Owens Corning.
   f. ROCKWOOL.
   g. Tremco, Inc.

2. L-Rating: Not exceeding 5.0 cfm/ft. of joint at both ambient and elevated temperatures.

D. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.

1. Sealant shall have a VOC content of 250 g/L or less.
2. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
3. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
4. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Formaldehyde emissions shall not exceed 9 mcg/cu. m or 7 ppb, whichever is less.
5. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
6. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." The building concentration of formaldehyde shall not exceed half of the indoor recommended exposure limit, or 33 mcg/cu. m, and that of acetaldehyde shall not exceed 9 mcg/cu. m.

2.3 ACCESSORIES

PART 3 - EXECUTION

3.1 INSTALLATION

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. General: Install joint firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

C. Install forming materials and other accessories of types required to support elastomeric 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 elastomeric 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.

D. Install elastomeric fill materials for joint firestopping systems by proven techniques to produce the following results:

1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.2 IDENTIFICATION

A. Wall Identification: Permanently label walls containing firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.

1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 ft. from end of wall and at intervals not exceeding 30 ft..

B. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping 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 - Joint Firestopping - 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.

END OF SECTION 078443

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SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Nonstaining silicone joint sealants.
3. Urethane joint sealants.
4. Mildew-resistant joint sealants.
5. Latex joint sealants.

1.2 PREINSTALLATION MEETINGS

1.3 ACTION SUBMITTALS

A. Product data.

B. Samples: Manufacturer's standard color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Joint sealant schedule.

1.4 INFORMATIONAL SUBMITTALS

A. Field Quality-Control Reports: For field-adhesion-test reports, for each sealant application tested.

B. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

A. Warranty Documentation:

1. Manufacturers' special warranties.
2. Installer's special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Authorized representative who is trained and approved by manufacturer.

B. Testing Agency Qualifications: Qualified in accordance with ASTM C1021 to conduct the testing indicated.

1.7 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Disintegration of joint substrates from causes exceeding design specifications.
2. Mechanical damage caused by individuals, tools, or other outside agents.
3. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. VOC Content: Sealants and sealant primers shall comply with the following:

1. Architectural sealants shall have a VOC content of 250 g/L or less.
2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.
3. Sealants and sealant primers for porous substrates shall have a VOC content of [775] g/L or less.

C. Colors of Exposed Joint Sealants:As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.

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. GE Construction Sealants; Momentive Performance Materials Inc.
b. Sika Corporation; Joint Sealants.

2.3 NONSTAINING SILICONE JOINT SEALANTS

A. Nonstaining Joint Sealants: No staining of substrates when tested in accordance with ASTM C1248.

B. Silicone, Nonstaining, S, NS, 100/50, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.

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. Pecora Corporation.
b. Sika Corporation; Joint Sealants.
c. Tremco Incorporated.

2.4 URETHANE JOINT SEALANTS

A. Urethane, S, NS, 100/50, T, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Uses T and NT.

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. Sika Corporation; Joint Sealants.

2.5 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

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. GE Construction Sealants; Momentive Performance Materials Inc.
b. Pecora Corporation.
c. The Dow Chemical Company.
d. Tremco Incorporated.

2.6 LATEX JOINT SEALANTS

A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.

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. Pecora Corporation.
b. Sherwin-Williams Company (The).
c. Tremco Incorporated.

2.7 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

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. Alcot Plastics Ltd.
b. Construction Foam Products; a division of Nomaco, Inc.
c. Master Builders Solutions.

B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin)], and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.8 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.
    d. Exterior insulation and finish systems.

3. Remove laitance and form-release agents from concrete.

4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

    1. Do not leave gaps between ends of sealant backings.
    2. Do not stretch, twist, puncture, or tear sealant backings.
    3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

    1. Place sealants so they directly contact and fully wet joint substrates.
    2. Completely fill recesses in each joint configuration.
    3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile in accordance with Figure 8A in ASTM C1193 unless otherwise indicated.

a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

G. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

H. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.3 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

a. Extent of Testing: Test completed and cured sealant joints as follows:

1) Perform one test for each 1000 ft of joint length thereafter or one test per each floor per elevation.

b. Test Method: Test joint sealants in accordance with Method A, Tail Procedure, in ASTM C1521.

1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

c. Inspect tested joints and report on the following:

1) Whether sealants filled joint cavities and are free of voids.
2) Whether sealant dimensions and configurations comply with specified requirements.

3) Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.

4)

2. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

B. Prepare test and inspection reports.

END OF SECTION 079200

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Access doors and frames.
2. Fire-rated access doors and frames.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each type of access door and frame and for each finish specified, complete assembly minimum 6 by 6 inches in size.

C. Product Schedule: For access doors and frames.[Use same designations indicated on Drawings.]

1.3 CLOSEOUT SUBMITTALS

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection **and temperature-rise limit** ratings indicated, according to NFPA 252 or UL 10B.

2.2 ACCESS DOORS AND FRAMES

A. Flush Access Doors with Exposed Flanges:

1. Manufacturers: Subject to compliance with requirements, [provide products by the following][provide products by one of the following][available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

   a. Activar Construction Products Group, Inc. - JL Industries.
   b. ACUDOR Products, Inc.
   c. Larsens Manufacturing Company.

d. Milcor; a division of Hart & Cooley, Inc.
e. Nystrom.

2. Description: Face of door flush with frame, with exposed flange and concealed hinge.
3. Optional Features:Piano hinges.
4. Locations: Wall and ceiling.
5. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch, 16 gage, factory primed.
6. Frame Material: Same material, thickness, and finish as door.
7. Latch and Lock:Cam latch, screwdriver operated.

2.3 FIRE-RATED ACCESS DOORS AND FRAMES

A. Fire-Rated,Flush Access Doors with Exposed Flanges :

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. Activar Construction Products Group, Inc. - JL Industries.
b. ACUDOR Products, Inc.
c. Larsens Manufacturing Company.
d. Milcor; a division of Hart & Cooley, Inc.
e. Nystrom.

2. Description: Door face flush with frame,with a core of mineral-fiber insulation enclosed in sheet metal; with exposed flange, self-closing door, and concealed hinge.
3. Locations:Wall and ceiling.
4. Fire-Resistance Rating: Not less than that indicated of adjacent construction][45 minutes][1 hour][1-1/2 hours][2 hours][3 hours]<Insert requirement>.
5. Metallic-Coated Steel Sheet for Door:Nominal 0.040 inch, 20 gage, factory primed.
6. Frame Material: Same material, thickness, and finish as door.
7. Latch and Lock: Self-latching door hardware, operated by knurled-knob with interior release.

2.4 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A879/A879M, with cold-rolled steel sheet substrate complying with ASTM A1008/A1008M, Commercial Steel (CS), exposed.

C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.

D. Frame Anchors: Same material as door face.

E. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.5 FABRICATION

A. 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.

B. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.

2.6 FINISHES

A. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083113

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SECTION 083323 - OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:

1. Section 055000 "Metal Fabrications" for miscellaneous steel supports, door-opening framing, corner guards, and bollards.

1.2 ACTION SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory.

1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

1. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
2. Show locations of controls, locking devices, detectors or replaceable fusible links, and other accessories.
3. Include diagrams for power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

1.4 CLOSEOUT SUBMITTALS

A. Special warranty.

B. Maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of doors that fail in materials or workmanship within specified warranty period.
   1. Warranty Period:Three years from date of Substantial Completion.
   2. PRODUCTS

1.7 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in **the Florida Accessibility Code and the USDOJ's "2010 ADA Standards for Accessible Design"**.

B. Structural Performance, Exterior Doors: Capable of withstanding the following design wind loads:

   1. Design Wind Load: **As indicated on Drawings.**.
   2. Testing: According to ASTM E330/E330M.

C. Windborne-Debris Impact Resistance: Provide **impact-protective** overhead coiling doors that pass ASTM E1886 missile-impact and cyclic-pressure tests according to **ASTM E1996 for Wind Zone** specified on the structural drawings.

   1. Large-Missile Test: For overhead coiling doors located within 30 ft.of grade.

1.8 DOOR ASSEMBLY

A. Insulated ServiceDoor: Overhead coiling door formed with curtain of interlocking metal slats.

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      a. Alpine Overhead Doors, Inc.
      b. Clopay Building Products.
      c. Cookson; a CornellCookson company.
      d. Cornell; a CornellCookson company.
      e. Overhead Door Corporation. Basis of Design.
      f. Raynor Garage Doors.

B. Operation Cycles: Door components and operators capable of operating for not less than 20,000.

C. Insulated Door Curtain R-Value:7.7.

D. Door Curtain Material:Aluminum.

E. Door Curtain Slats:Fla profile slats of 1-7/8-inch center-to-center height.

1. Insulated-Slat Interior Facing: Metal.

F. Bottom Bar: Two angles, each not less than1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from aluminum extrusions and finishedto match door.

G. Curtain Jamb Guides:Aluminum with exposed finish matching curtain slats.

H. Hood:Match curtain material and finish.

1. Mounting: Face of wall.

I. Locking Devices: Equip door withslide bolt for padlock and chain lock keeper.

1. Locking Device Assembly: locking bars, operable from inside with thumbturn.

J. Electric Door Operator:

1. Usage Classification: Heavy duty, 25 or more cycles per hour and more than 90 cycles per day.
2. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use.
3. Motor Exposure:Interior.
4. Motor Electrical Characteristics:
5. Emergency Manual Operation:Chain type.
6. Obstruction-Detection Device: Automaticphotoelectric senso.
7. Control Station(s): Interior mounted.
8. Other Equipment:Audible and visual signals

K. Curtain Accessories: Equip door with weatherseals .

L. Door Finish:

1. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.
2. Interior Curtain-Slat Facing: Finish as selected by Architect from manufacturer's full range.

1.9 MATERIALS, GENERAL

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.

1.10 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E84 or UL 723. Enclose insulation completely within slat faces.
2. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face, withminimum aluminum thickness of 0.032 inch.

B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

1.11 HOODS

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

1.12 LOCKING DEVICES

A. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

1.13 CURTAIN ACCESSORIES

A. Weatherseals for Exterior Doors: Equip each exterior door with weather-stripping gaskets fitted to entire exterior perimeter of door for a weather-resistant installation unless otherwise indicated.

1.14 COUNTERBALANCE MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

1.15 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

1. Comply with NFPA 70.
2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V ac or dc.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

C. Motors: Reversible-type motor with controller (disconnect switch) for motor exposure indicated for each door assembly.

1. Electrical Characteristics: Minimum as indicated for each door assembly. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
2. Operating Controls, Controllers, Disconnect Switches, Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.

D. Obstruction-Detection Devices: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of door opening. For non-fire-rated doors, activation of device immediately stops and reverses downward door travel.

1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.

a. Self-Monitoring Type: Designed to interface with door operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, door closes only with sustained or constant pressure on close button.

E. Control Station: Three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure push-button control labeled "Close."

1. Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

F. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed25 lbf.

G. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

H. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

I. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with the accessibility standard.

PART 2 - EXECUTION

2.1 INSTALLATION, GENERAL

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Power-Operated Doors: Install according to UL 325.

2.2 FIELD QUALITY CONTROL

A. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

B. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

2.3 DEMONSTRATION

A.

END OF SECTION 083323

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SECTION 084413 - GLAZED ALUMINUM CURTAIN WALLS

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. Glazed aluminum curtain wall systems:

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer and that employs a qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AGM) contractors[and that employs glazing technicians certified under the Architectural Glass and Metal Technician (AGMT) certification program].

B. Testing Agency Qualifications: Qualified in accordance with ASTM E699 for testing indicated[and accredited by IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC 17025] and acceptable to Owner and Architect.

C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. 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.

1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.7 WARRANTY

A. Special Assembly Warranty: Manufacturer agrees to repair or replace components of glazed aluminum curtain wall that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Warranty Period:10 years from date of Substantial Completion.

B. Special Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of baked enamel, powder coat, or organic finishes within specified warranty period.

C. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration finishes within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazed aluminum curtain walls.

B. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Glazed aluminum curtain walls shall withstand movements of supporting structure, including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Failure also includes the following:

a. Thermal stresses transferring to building structure.
b. Glass breakage.
c. Noise or vibration created by wind and thermal and structural movements.
d. Loosening or weakening of fasteners, attachments, and other components.
e. Failure of operating units.

C. Structural Loads:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads:**As indicated on Drawings**.

D. Deflection of Framing Members Supporting Glass: At design wind load, as follows:

1. Deflection Normal to Wall Plane: Limited to **1/175 of clear span for spans of up to** 13 feet 6 inches **and to 1/240 of clear span plus** 1/4 inch **for spans of greater than** 13 feet 6 inches.
2. Deflection Parallel to Glazing Plane: Limited to **amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than** 1/8 inch.

   a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.

3. Cantilever Deflection: Limited to 2l/175 at unsupported cantilevers.

E. Structural: Test in accordance with ASTM E330/E330M as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
2. When tested at **150** percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding **0.2** percent of span.
3. Test Durations: As required by design wind velocity, but not less than**10** seconds.

F. Water Penetration under Static Pressure: Test in accordance with ASTM E331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested in accordance with a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..

G. Energy Performance: Certified and labelled by manufacturer for energy performance as follows:

1. Thermal Transmittance (U-factor):

a. Fixed Glazing and Framing Areas: U-factor for the system of not more than 0.46 Btu/sq. ft. x h x deg F as determined in accordance with NFRC 100.

2. Solar Heat Gain Coefficient (SHGC):

a. Fixed Glazing and Framing Areas: SHGC for the system of not more than **0.35** as determined in accordance with NFRC 200.

3. Air Leakage:

a. Fixed Glazing and Framing Areas: Air leakage for the system of not more than 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft. when tested in accordance with ASTM E283.

4. Condensation Resistance Factor (CRF):

a. Fixed Glazing and Framing Areas: CRF for the system of not less than **29** as determined in accordance with AAMA 1503.

H. Windborne-Debris Impact Resistance: Pass ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone specified on the drawings for [**basic**] [**enhanced**] protection.

1. Large-Missile Test: For glazing located within 30 fee of grade.
2. Small-Missile Test: For glazing located between 30 feet and 60 feet above grade.

I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

K. Sound Transmission: Provide glazed aluminum curtain walls with fixed glazing and framing areas having the following sound-transmission characteristics:
1. Outdoor-Indoor Transmission Class: Minimum 26 when tested for ladoratory sound transmission loss according to ASTM E9 and determined by ASTM E 1332.

2.2 GLAZED ALUMINUM CURTAIN WALL SYSTEMS

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. Kawneer North America, an Arconic company.
2. U.S. Aluminum; a brand of C.R. Laurence.
3. YKK AP America Inc. YHC 300OG Aluminum Curtain wall System BASIS OF DESIGN.

B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken.
2. Glazing Plane: Center.
3. Finish:match existing.
4. System: Either stick or unitized system.
5. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
6. Steel Reinforcement: As required by manufacturer.

C. Pressure Caps: Manufacturer's standard aluminum components that mechanically retain glazing.

1. Include snap-on aluminum trim that conceals fasteners.

D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

2.3 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: ASTM C509 or ASTM C864. Manufacturer's standard.

1. Color: Black.

C. Glazing Sealants: As recommended by manufacturer.

1. Sealant shall have a VOC content of 250 g/L or less.

2.4 MATERIALS

A. Sheet and Plate: ASTM B209.

B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.

C. Structural Profiles: ASTM B308/B308M.

D. Steel Reinforcement:

1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.

E. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods in accordance with recommendations in SSPC-SP COM, and prepare surfaces in accordance with applicable SSPC standard.

2.5 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. 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. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
6. Components curved to indicated radii.

D. Fabricate components to resist water penetration as follows:

1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
2. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.

E. Curtain-Wall Framing: Fabricate components for assembly using **manufacturer's standard assembly method**.

F. Factory-Assembled Frame Units:

1. Rigidly secure nonmovement joints.
2. Prepare surfaces that are in contact with structural sealant in accordance with sealant manufacturer's written instructions, to ensure compatibility and adhesion.
3. Preparation includes, but is not limited to, cleaning and priming surfaces.
4. Seal joints watertight unless otherwise indicated.
5. Install glazing to comply with requirements in Section 088000 "Glazing."

G. After fabrication, clearly mark components to identify their locations in Project in accordance with Shop DrawingsInsert integral stabilization requirements for descent-control equipment used for maintenance if any.

2.6 ALUMINUM FINISHES

A. Color Anodic Finish: AAMA 611, [AA-M12C22A42/A44, Class I, 0.018 mm] [AA-M12C22A32/A34, Class II, 0.010 mm] or thicker.

1. Color:Match existing..

PART 3 - ..EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with manufacturer's written instructions.

B. Do not install damaged components.

C. Fit joints to produce hairline joints free of burrs and distortion.

D. Rigidly secure nonmovement joints.

E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

F. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.

G. Seal joints watertight unless otherwise indicated.

H. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

I. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.

J. Install components plumb and true in alignment with established lines and grades.

3.2 INSTALLATION OF GLAZING

END OF SECTION 084413

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SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined in accordance with the IBC and ASTM E1300:

1. Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.

B. Windborne-Debris-Impact Resistance: Exterior glazing shall pass ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone specified on the drawings.

1. Large-Missile Test: For glazing located within 30 feet of grade.
2. Small-Missile Test: For glazing located between 30 feet and 60 feetabove grade.

C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

D. 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. U-Factors: Center-of-glazing values, in accordance with NFRC 100 and based on most current non-beta version of LBL's WINDOW computer program, expressed as Btu/sq. ft. x h x deg F.
2. SHGC and Visible Transmittance: Center-of-glazing values, in accordance with NFRC 200 and based on most current non-beta version of LBL's WINDOW computer program.
3. Visible Reflectance: Center-of-glazing values, in accordance with NFRC 300.

E. Acoustic Performance:

1. Exterior Glazing: **28** OITC.
2. Interior Glazing: **35** STC.

2.2 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. NGA Publications:"Laminated Glazing Reference Manual" and "Glazing Manual."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label ofthe SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the IGCC.

D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.

E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.3 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.

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. AGC Glass Company North America, Inc.
b. Cardinal Glass Industries.
c. Guardian Glass; SunGuard.
d. Pilkington North America.
e. Vitro Architectural Glass.

B. Heat-Strengthened Float Glass: ASTM C1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

C. Reflective- and Low-E-Coated Vision Glass: ASTM C1376.

D. Ceramic-Coated Vision Glass: ASTM C1048, Condition C, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3; and complying with Specification No. 95-1-31 in NGA's "Engineering Standards Manual."

E. Ceramic-Coated Spandrel Glass: ASTM C1048, Type I, Condition B, Quality-Q3.

2.4 LAMINATED GLASS

A. Laminated Glass: ASTM C1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

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. Eastman Chemical Company.
   b. Kuraray America, Inc.

2. Construction: Laminate glass with polyvinyl butyral interlayerto comply with interlayer manufacturer's written instructions.
3. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
4. Interlayer Color: Clear unless otherwise indicated.
5. For polyvinyl butyral interlayers, laminate lites in autoclave with heat plus pressure.
6. Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets.

B. Windborne-Debris-Impact-Resistant Laminated Glass: Comply with requirements specified above for laminated glass except laminate glass with[one of] the following to comply with interlayer manufacturer's written instructions:

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. Eastman Chemical Company.
   b. Kuraray America, Inc.

2. Construction: Laminate glass withpolyvinyl butyral interlayer reinforced with polyethylene terephthalate film to comply with interlayer manufacturer's written instructions.
3. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
4. Interlayer Color: Clear unless otherwise indicated.

2.5 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified in accordance with ASTM E2190.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
2. Perimeter Spacer: Manufacturer's standard spacer material and construction.

    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) Technoform.
        2) Thermix; a brand of Ensinger USA.

3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.6 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they 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 of industry colors.

B. Neutral-Curing Silicone Glazing Sealant, Class 100/50: Complying with ASTM C920, Type S, Grade NS, Use NT.

1. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

    a. GE Construction Sealants; Momentive Performance Materials Inc. SCS9000 and SCS 2900
    b. Pecora Corporation. 865, 895, and 898
    c. Sika Corporation.
    d. The Dow Chemical Company.7Tremco Incorporated.
    e.

C. Neutral-Curing Silicone Glazing Sealant, Class 50: Complying with ASTM C920, Type S, Grade NS, Use NT.

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

B. Setting Blocks:

1. EPDM with Shore A durometer hardness of 85, plus or minus 5.

C. Edge Blocks:

1. EPDM with Shore A durometer hardness per manufacturer's written instructions.

D. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

PART 3 - EXECUTION

3.1 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. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. 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.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches.

G. 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 in accordance with requirements in referenced glazing publications.

3.2 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Apply heel bead of elastomeric sealant.

F. Center glass lites in openings on setting blocks, and press firmly against tape 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.

G. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.3 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 in writing 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 in writing by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.4 SEALANT GLAZING (WET)

A. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

3.5 CLEANING AND PROTECTION

A. Immediately after installation, remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. 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.

1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

3.6 MONOLITHIC GLASS SCHEDULE

3.7 LAMINATED GLASS SCHEDULE

A. Clear Laminated Glass Type :Match Existing.

3.8 INSULATING-LAMINATED-GLASS SCHEDULE

A. Clear Insulating, Laminated Glass Type Match Existing.

B. Tinted, Insulating Laminated Glass Type :

1. Basis-of-Design Product: Match Existing.

C. Reflective-Coated, Insulating Laminated Glass Type :

1. Match Existing.

END OF SECTION

SECTION 089119 - FIXED LOUVERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fixed [extruded-aluminum] [and] [formed-metal] louvers.
   1. Fixed formed-metal acoustical louvers.
   2. Blank-off panels for louvers

1.2 ACTION SUBMITTALS

A. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing. Show anchorage details

B. Submt signed and sealed structural calculations.

C. Florida Product Approval Number or Miami Dade Count Certificate. Certification shall be current.

D. Samples: For each type of metal finish required.

E. Delegated Design Submittal: For louvers indicated to comply with structura performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed in accordance with AMCA 500-L.

B. Sample warranties.

1.4 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

   1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.5 WARRANTY

A. Special Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of baked enamel, powder coat, or organic finishes within specified warranty period.

B. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.

1. Warranty Period:Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design louvers, including comprehensive engineering analysis by a qualified professional engineer, using structural[and seismic] performance requirements and design criteria indicated.

B. Structural Performance: Louvers withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures are considered to act normal to the face of the building.

1. Wind Loads:

a. Determine loads based on pressures as indicated on Drawings.

C. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width in accordance with AMCA 500-L.

2.2 FIXED EXTRUDED-ALUMINUM LOUVERS

A. Horizontal Drainable-Blade Louver, Extruded Aluminum <Insert drawing designation>:

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. Airolite Company, LLC (The).
b. Construction Specialties, Inc.

c. Greenheck Fan Corporation.
d. Ruskin Company.

2. Louver Depth: 4 inches..
3. Frame and Blade Nominal Thickness: Not less than 0.060 inch for blades and 0.080 inch for frames.
4. Louver Performance Ratings:

a. Free Area: Not less than 9.46 sq. ft. for 48-inch- wide by 48-inch- high louver.
b. Wind Driven Rain Performance: AMCA Licensed for High Velocity Wind driven rain resistant louvers (AMCA 550).

5. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.3 LOUVER SCREENS

A. General: Provide screen at [each exterior louver] [louvers indicated].

1. Screen Location for Fixed Louvers: Interior face.
2. Screening Type:Bird screening.

B. Louver Screen Frames: Same type and form of metal as indicated for louver to which screens are attached.

C. Louver Screening for Aluminum Louvers:

1. Bird Screening, Aluminum: 1/2-inch- square mesh, 0.063-inch wire.

2.4 MATERIALS

A. Aluminum Extrusions: ASTM B221, Alloy 6063-T5, T-52, or T6.

B. Aluminum Sheet: ASTM B209, Alloy 3003 or 5005, with temper as required for forming, or as otherwise recommended by metal producer for required finish.

C. Fasteners: Use types and sizes to suit unit installation conditions.

1. Use tamper-resistant screws for exposed fasteners unless otherwise indicated.
2. For fastening aluminum, use aluminum or 300 series stainless steel fasteners.
3. For color-finished louvers, use fasteners with heads that match color of louvers.

D. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, fabricated from stainless steel components, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing according to ASTM E488/E488M conducted by a qualified testing agency.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.5 FABRICATION

A. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

B. Join frame members to each other and to fixed louver blades with fillet welds **concealed from view** unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.6 ALUMINUM FINISHES

A. Superior-Performance Organic Finish, Three-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.

1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions [for seacoast and severe environments].
2. Color and Gloss:As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.

B. 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.

C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

D. Protect unpainted galvanized- and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

3.2 ADJUSTING

A. Restore louvers damaged during installation and construction, 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.

END OF SECTION

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of code-compliance certification for studs and tracks.

B. Evaluation reports from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.4 QUALITY ASSURANCE

A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Framing Industry Association.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C645 and ASTM C645, Section 10 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C645 and AISI S220 and ASTM C645, Section 10 requirements for metal unless otherwise indicated
2. Protective Coating: Comply with ASTM C645; ASTM A653/A653M, G40; or coating with equivalent corrosion resistance. Galvannealed products are unacceptable.

    a. Coating demonstrates equivalent corrosion resistance with an evaluation report acceptable to authorities having jurisdiction.

B. Studs and Track: ASTM C645, Section 10.

1. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

    a. CEMCO; California Expanded Metal Products Co.

    b. ClarkDietrich.
    c. MarinoWARE.
    d. Steel Construction Systems.

2. Minimum Base-Steel Thickness:As required by performance requirements for horizontal deflection and specified on the drawings..

C. Slip-Type Head Joints: Where indicated, provide[one of] the following:

1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 1-1/2-inch minimum vertical movement.

    a. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

        1) CEMCO; California Expanded Metal Products Co.
        2) ClarkDietrich.
        3) Fire Trak Corp.
        4) MarinoWARE.

2. Single Long-Leg Track System: ASTM C645 top track with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
3. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

    a. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

        1) CEMCO; California Expanded Metal Products Co.
        2) ClarkDietrich.
        3) MarinoWARE.
        4) MBA Building Supplies.

D. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

    a. CEMCO; California Expanded Metal Products Co.
    b. ClarkDietrich.
    c. Fire Trak Corp.
    d. MarinoWARE.

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

    a. ClarkDietrich.
    b. MarinoWARE.
    c. MBA Building Supplies.
    d. MRI Steel Framing, LLC.

2. Minimum Base-Steel Thickness:0.0179 inch.

F. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-steel thickness, with minimum 1/2-inch- wide flanges.

1. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

   a. ClarkDietrich.
   b. MarinoWARE.
   c. MBA Building Supplies.
   d. MRI Steel Framing, LLC.

2. Depth:1-1/2 inches.
3. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.

G. Hat-Shaped, Rigid Furring Channels: ASTM C645.

1. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

   a. ClarkDietrich.
   b. Jaimes Industries.
   c. MarinoWARE.
   d. MRI Steel Framing, LLC.

2. Minimum Base-Steel Thickness:0.0179 inch.

H. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.

I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-steel thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

1. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

   a. ClarkDietrich.
   b. MarinoWARE.
   c. MRI Steel Framing, LLC.

2.3 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Installation Standard: ASTM C754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.

B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.2 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.

2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: 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.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

    a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

E. Direct Furring:

1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

END OF SECTION

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.

1.2 ACTION SUBMITTALS

A. Product data.

B. Shop Drawings: Show locations and installation of control and expansion joints, including plans, elevations, sections, details of components, and attachments to other work.

C. Samples: For each texture finish indicated on same backing indicated for Work.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.2 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C1396/C1396M.

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. American Gypsum.
b. Certainteed; SAINT-GOBAIN.
c. National Gypsum Company.
d. USG Corporation.

2. Thickness: 5/8 inch.
3. Long Edges: [Tapered] [Tapered and featured (rounded or beveled) for prefilling].

B. Gypsum Board, Type X: ASTM C1396/C1396M.

C. Abuse-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.

1. Manufacturers: available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. American Gypsum.
   b. Certainteed; SAINT-GOBAIN.
   c. USG Corporation.

2. Core:5/8 inch, Type X.
3. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
4. Indentation: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
5. Soft-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
6. Long Edges: Tapered.
7. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

D. Impact-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.

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. American Gypsum.
   b. Certainteed; SAINT-GOBAIN.
   c. National Gypsum Company.
   d. USG Corporation.

2. Core:5/8 inch, Type X.
3. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
4. Indentation: ASTM C1629/C1629M, meets or exceeds Level 3requirements.
5. Soft-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
6. Hard-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 3 requirements according to test in Annex A1.
7. Long Edges: Tapered.
8. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.3 TRIM ACCESSORIES

A. Interior Trim: ASTM C1047.

1. Material: [Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel shee.
2. Shapes:

   a. Cornerbead.
   b. LC-Bead: J-shaped; exposed long flange receives joint compound.
   c. L-Bead: L-shaped; exposed long flange receives joint compound.
   d. Expansion (control) joint.

2.4 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475/C475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.

C. Joint Compound for Interior Gypsum Board: 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, fasteners, and trim flanges, use setting-type taping compound.

   a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable toppingcompound.

2.5 AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Steel Drill Screws: ASTM C1002 unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION OF PANELS

A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

B. Comply with ASTM C840.

C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

D. For trim with back flanges intended or fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

3.2 FINISHING OF GYPSUM BOARD

A. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

B. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:

1. Level 4: [At panel surfaces that will be exposed to view unless otherwise indicated] <Insert locations>.

3.3 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

PART 2 - PRODUCTS

2.1 PAINT PRODUCTS, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by topcoat manufacturer for use in paint system and on substrate indicated.

B. Colors: [**As selected by Architect from manufacturer's full range**] [**Match Architect's samples**] [**As indicated in a color schedule**] <**Insert requirements**>.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify suitability of substrates, including surface conditions and compatibility, with finishes and primers.

B. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems specified in this Section.

3.3 INSTALLATION

A. Apply paints in accordance with manufacturer's written instructions.

B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

A. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

B. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

C. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION

SECTION 099123 - INTERIOR PAINTING

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. Primers.
2. Water-based finish coatings.

B. Related Requirements:

1. [Section 051200 "Structural Steel Framing"] [Section 051213 "Architecturally Exposed Structural Steel Framing"] for shop priming structural steel.
2. Section 055000 "Metal Fabrications" for shop priming metal fabrications.
3. Section 055213 "Pipe and Tube Railings" for shop [priming] [painting] pipe and tube railings.
4. Section 099600 "High-Performance Coatings" for tile-like coatings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include preparation requirements and application instructions.
2. Indicate VOC content.

B. Samples: For each type of topcoat product.

C. Samples for Initial Selection: For each type of topcoat product.

D. Samples for Verification: For each type of paint system and each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

E. Product Schedule: Use same designations indicated on Drawings and in the Interior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

1.4 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. Paint Products:5 percent, but not less than 1 gal of each material and color applied.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures of less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

1. Benjamin Moore & Co.
2. PPG Paints.
3. Sherwin-Williams Company (The).

B. Source Limitations: Obtain each paint product from single source from single manufacturer.

2.2 PAINT PRODUCTS, GENERAL

A. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

B. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.

C. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.3 PRIMERS

A. Interior/Exterior Latex Block Filler: Water-based, high-solids, emulsion coating formulated to bridge and fill porous surfaces of exterior concrete masonry units in preparation for specified subsequent coatings.

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. Benjamin Moore & Co.
b.
c. PPG Paints.
d. Sherwin-Williams Company (The).

B. Alkali-Resistant, Water-Based Primer: Water-based primer formulated for use on alkaline surfaces, such as plaster, vertical concrete, and masonry.

C. Interior Latex Primer Sealer: Water-based latex sealer used on new interior plaster, concrete, and gypsum wallboard surfaces.

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. Benjamin Moore & Co.
b. PPG Paints.
c. Sherwin-Williams Company (The).

D. Water-Based Rust-Inhibitive Primer: Corrosion-resistant, water-based-emulsion primer formulated for resistance to flash rusting when applied to cleaned, interior ferrous metals subject to mildly corrosive environments.

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. Benjamin Moore & Co.
b. PPG Paints.
c. Sherwin-Williams Company (The).

2.4 WATER-BASED FINISH COATS

A. Interior, Latex, Flat: Pigmented, water-based paint for use on primed/sealed interior plaster and gypsum board, and on primed wood and metals.

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. Benjamin Moore & Co.
b. PPG Paints.
c. Sherwin-Williams Company (The).

B. Interior, Latex, Eggshell: Pigmented, water-based paint for use on primed/sealed interior plaster and gypsum board, and on primed wood and metals.

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. Benjamin Moore & Co.
b. PPG Paints.
c. Sherwin-Williams Company (The).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1.
2. Masonry (Clay and CMUs): 12 percent.
3. Gypsum Board: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

   1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 INSTALLATION

A. Apply paints according to manufacturer's written instructions.

   1. Use applicators and techniques suited for paint and substrate indicated.
   2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
   3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
   4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire-Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:

a. Uninsulated metal piping.
b. Uninsulated plastic piping.
c. Pipe hangers and supports.
d. Metal conduit.
e. Tanks that do not have factory-applied final finishes.
f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material..

2. Paint the following work where exposed in occupied spaces
a. Uninsulated metal piping.
b. Uninsulated plastic piping.
c. Pipe hangers and supports.
d. Metal conduit.
e. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
f. Other items as directed by Architect.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry-Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry-film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry-film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry-film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
3. Allow empty paint cans to dry before disposal.
4. Collect waste paint by type and deliver to recycling or collection facility.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System <Insert drawing designation>:

a. Prime Coat: [Alkali-resistant, water-based primer] [Matching topcoat].
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior latex paint.

B. CMU Substrates:

1. Latex System <Insert drawing designation>:

a. Block Filler: Interior/exterior latex block filler.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, latex.
d.

2. Latex over Shop-Applied Quick-Drying Shop Primer System :

a. Prime Coat: Quick-dry primer for shop application.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, latex.

d. Topcoat: Interior, alkyd, .

C. Substrates:

1. Latex over Latex Sealer System :

a. Intermediate Coat: Matching topcoat.
b. Topcoat: Interior, latex, .

END OF SECTION

SECTION 099611 - HIGH-PERFORMANCE COATINGS (PROPRIETARY SPECIFICATION)

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and application of high-performance coating systems **on the following substrates:**

1. Interior Substrates:

   a. Concrete vertical surfaces.
   b. CMUs.
   c. Steel.
   d. Gypsum board.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each type of coating system and each color and gloss of topcoat indicated.

C. Product List: Use same designations indicated on Drawings and in Exterior High-Performance Coating Schedule and Interior High-Performance Coating Schedule. Include color designations and product runs (batch numbers).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

1. Benjamin Moore & Co.
2. PPG Paints.
3. Sherwin-Williams Company (The).
4. Tnemec Inc. Basis of Design
5. <Insert manufacturer's name>.

2.2 HIGH-PERFORMANCE COATINGS

A. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
3. Products shall be of same manufacturer for each coat in a coating system.

B. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Primers, Sealers, and Undercoaters: 200 g/L.
4. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
5. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
6. Pretreatment Wash Primers: 420 g/L.

C. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Colors: **As selected by Architect from manufacturer's full range**.

2.3 BLOCK FILLERS

A. Latex Block Filler: Water-based, pigmented, emulsion coating with minimum of 50 percent solids by volume; formulated to bridge and fill porous surfaces of CMUs in preparation for specified intermediate and topcoat coatings:

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. Benjamin Moore & Co.
   b. PPG Paints.
   c. Sherwin-Williams Company (The).
   d. Tnemec Inc.

2.4 EPOXY COATINGS

A. Interior Epoxy-Modified Latex, Semigloss: Water-based, two-component, epoxy-modified latex paint for use on masonry, gypsum board, and primed metal surfaces.

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. Devoe Coatings; Akzo Nobel.
b. PPG Paints.
c. .Sherwin Williams

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. CMUs: 12 percent.
3. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions applicable to substrates and coating systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted.

1. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
2. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed.
3. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk.

1. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
2. Clean surfaces with pressurized water.

E. Masonry Substrates: Remove efflorescence and chalk.

1. Do not coat surfaces if moisture content, alkalinity of surfaces, or alkalinity of mortar joints exceeds that permitted in manufacturer's written instructions.
2. Clean surfaces with pressurized water. Use pressure range of 100 to 600 psiat 6 to 12 inches.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any.

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Steel Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.

I. Aluminum Substrates: Remove loose surface oxidation.

3.3 APPLICATION

A. Apply high-performance coatings in accordance with manufacturer's written instructions.

B. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Concrete Substrates, Vertical Surfaces:

1. Epoxy System:

a. Prime Coat: Epoxy, matching topcoat.
b. Intermediate Coat: Epoxy, matching topcoat.

3.5 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. [Gypsum Board] [Plaster] Substrates:

1. Epoxy System:

a. Prime Coat: Primer sealer, latex, interior.
b. Intermediate Coat: Epoxy, matching topcoat.
c. Topcoat: Epoxy, [semigloss] [gloss].

END OF SECTION 099611

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SECTION 101400 - SIGNAGE

PART 1 - GENERAL (Not Applicable)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 104413 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-protection cabinets for portable fire extinguishers.

1.2 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.

2.2 FABRICATION

A. 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.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Prepare recesses for fire-protection cabinets as required by type and size of cabinet and trim style.

B. Install fire-protection cabinets in locations and at mounting heights indicated[**or, if not indicated, at heights acceptable to authorities having jurisdiction].**

C. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

D. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

END OF SECTION

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes portable, hand-carried fire extinguishers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.6 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. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each [fire-protection cabinet] [and] [mounting bracket] 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. Amerex Corporation.
b. Guardian Fire Equipment, Inc.
c. Kidde; Carrier Global Corporation.
d. Larsens Manufacturing Company.
e. Potter Roemer LLC; a Division of Morris Group International.

2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

B.

C. Clean-Agent Type in Steel Container2-A:10-B:C, 14-lbnominal capacity, with HFC blend agent and inert material in enameled-steel container; with pressure-indicating gage.

2.3 MOUNTING BRACKETS

A. 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 black baked-enamel finish.

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. Amerex Corporation.
b. Guardian Fire Equipment, Inc.
c. Kidde; Carrier Global Corporation.
d. Larsens Manufacturing Company.
e. Potter Roemer LLC; a Division of Morris Group International.

B. Identification: Lettering complying with authorities 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 INSTALLATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Install fire extinguishers **and mounting brackets**in locations indicated and in compliance with requirements of authorities having jurisdiction.

C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

1. Mounting Height: Top of fire extinguisher to be at 42 inches above finished floor.

END OF SECTION 104416

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SECTION 211300 - BUILDING SPRINKLER SYSTEMS

1 GENERAL

1.1 Drawings and General provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Requirements and Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of fire protection work is indicated on drawings and schedules, and by requirements of this section.

1.4 Refer to Division-2 sections for site fire protection piping and appurtenances; not work of this section.

1.5 Refer to other Division-21 sections for site fire protection piping and appurtenances; not work of this section.

1.6 Refer to Division-9 sections for painting of fire protection piping; not work of this section.

1.7 Refer to Division-26 sections for the following work; not work of this section.

1.7.1 Power supply wiring from power source to power connection on air compressors . Include disconnects and required electrical devices, except where specified as furnished or factory-installed by manufacturer.

1.7.2 Fire alarm connections for all flow switches, pressure switches, and supervisory (tamper) switches.

1.8 Codes and Standards:

1.8.1 NFPA Compliance: Install fire protection systems in accordance with NFPA 13 "Standard for the Installation of Sprinkler Systems"

1.8.2 UL Compliance: Provide fire protection products in accordance with UL standards; provide UL label on each product.

1.8.3 Fire Department/Marshal Compliance: Install fire protection systems in accordance with local regulations of fire department or fire marshal.

1.8.4 Screw Thread Connections: Comply with local Fire Department/Fire Marshal regulations for sizes, threading and arrangement of connections for fire department equipment to sprinkler systems.

1.9 Approval Submittals:

1.9.1 Product Data: Submit manufacturer's technical product data and installation instructions for:

Pipe and fittings
Basic pipe supports and hangers
Basic valves
Special valves
Pressure gauges
Automatic sprinklers
Cabinets

1.10.2 Working (Shop) Drawings: Prepare working (shop) drawings of fire protection systems indicating pipe sizes, pipe locations, pipe elevations, fittings, shutoffs, hangers, equipment, and coordination with other building systems. Submittal shall show all requirements per NFPA-13.

1.11 Test Reports and Verification Submittals:

1.11.1 Certificate: Submit certificate of Aboveground Installation upon completion of fire protection piping work which indicates that work has been tested in accordance with NFPA 13 and that system is operational, complete, and has no defects.

1.11.2 Tag: Submit a copy of the sprinkler system tag. The installing fire sprinkler contractor shall be licensed in accordance with State Fire Marshal (SFM) Rule 4A-46. At the conclusion of the project and prior to the final inspection by the SFM the Contractor shall tag the fire sprinkler system in accordance with 4A-46.041.

1.12 O&M Data Submittals:

1.12.1 Record Drawings: At project closeout, submit record drawings of installed fire protection piping and products.

1.12.2 Maintenance Data: Submit a copy of all approval submittals. Submit maintenance data and parts lists for basic valves, special valves, air compressors and exhausters. Include these data in O&M manual.

1.12.3 NFPA 25: Provide a copy of NFPA 25 in each O&M Manual.

2 PRODUCTS

2.1 General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in fire protection systems. Where more than one type of material or products are indicated, selection is Installer's option.

2.2 Basic Identification: Provide identification complying with Division-23 Basic Mechanical Materials and Methods section "Mechanical Identification", in accordance with the following listing:

Fire Protection Piping: Plastic pipe markers. Fire piping exposed in mechanical and electrical rooms shall be painted red.

Fire Protection Valves: Plastic or brass valve tags

Fire Protection Signs: Provide the following signs:

At each sprinkler valve, sign indicating what portion of system valve controls and hydraulic design data.

At each auxiliary drain, a sign indicating location.

2.3 Basic Pipes and Pipe Fittings: Provide pipes and pipe fittings complying with Division-23 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing. Where multiple listings are made for a particular type system, the material is the Installer's option.

2.4 Wet Pipe: Seamless black steel pipe; Schedule 40 for less than 8"; Schedule 30 for 8" and larger. Fittings and joints shall be as follows.

1 Class 125, cast-iron threaded fittings with threaded joints.

2 Mechanical grooved pipe coupling and fittings; cut-groove type with mechanical joints.

3 Wrought steel buttwelding fittings with welded joints.

2.4.1 Wet Pipe: Seamless black steel pipe; Schedule 10 for 5" and smaller; 0.134" wall thickness for 6"; and 0.188" wall thickness for 8" and 10".

1 Class 125, cast-iron threaded fittings with threaded joints, sizes 2½" and larger.

2 Mechanical grooved pipe couplings and fittings; roll-groove or mechanical locking type with mechanical joints.

3 Wrought steel buttwelding fittings with welded joints.

2.5 Basic Piping Specialties: Provide piping specialties complying with Division-23 Basic Mechanical Materials and Methods section "Piping Specialties".

2.6 Basic Supports and Anchors: Provide supports and anchors complying with Division-23 Basic Mechanical Materials and Methods section "Supports and Anchors", in accordance with the following listing:

Adjustable steel clevis hangers or adjustable steel band hangers for horizontal-piping hangers and supports.

Two-bolt riser clamps for vertical piping supports.

Steel turnbuckles and malleable iron sockets for hanger-rod attachments.

Concrete inserts, top-beam C-clamps, side beam or channel clamps or center beam clamps for building attachments.

2.7 Basic Valves: Provide interior valves complying with Division-23 Basic Mechanical Materials and Methods section "Valves", in accordance with the following listing:

2.7.1 Standard Service Code-Required OS&Y Valves: GA-6, GA-7.

2.7.2 Standard Service Sectional Valves: GA-6, GA-7. BF-6, BF-7.

2.7.3 Standard Service Indicating Valves: GA-6, GA-7, BA-6.

2.7.4 Standard Service Trim Valves: GA-6, BA-4.

2.7.5 Standard Service Check Valves: CK-4, CK-5.

2.8 Special Valves:

2.8.1 General: Provide valves, UL listed, in accordance with the following listing. Provide sizes and types which mate and match piping and equipment connections.

2.8.2 Alarm Check Valve: Provide cast-iron water flow alarm check valve, 175 psi working pressure, with retard chamber.

2.8.3 Hose Outlet Valves: Provide angle hose valves, 2-1/2" size where not otherwise indicated. Provide chrome plated with escutcheons where mounted in cabinet. Provide chain and cap.

2.8.4 Ball Drip Check Valve: Provide fire department connection iron swing check valve, 175 psi rated working pressure, of size and end type indicated, with ball drip.

2.8.5 Acceptable Manufacturers: Subject to compliance with requirements, provide valves of one of the following:

Grinnell Fire Protection Systems Co., Inc.
Grunau Sprinkler Mfr. Co., Inc.
Reliable
Viking Corporation

2.9 Basic Meters and Gauges: Provide meters and gauges complying with Division-23 Basic Mechanical Materials and Methods section "Meters and Gauges", in accordance with the following listing:

2.9.1 Pressure gauges, 0-250 psi range.

2.10 Fire Protection Specialties: Provide fire protection specialties, UL listed, in accordance with

the following listing. Provide sizes and types which mate and match piping and equipment connections.

2.10.1 Water Flow Indicators: Provide vane type water flow switches, with adjustable retard.

2.10.2 Supervisory Switches: Provide products recommended by manufacturer for use in service indicated.

2.10.3 Acceptable Manufacturers: Subject to compliance with requirements, provide fire protection specialties of one of the following:

Grinnell Fire Protection Systems Co., Inc.
Grunau Sprinkler Mfr. Co., Inc.
Guardian Fire Equipment, Inc.
Potter Roemer, Inc.
Reliable
Viking Corporation

2.11 Automatic Sprinklers: Provide automatic sprinklers and escutcheons of type indicated on drawings, and in accordance with the following listing. Provide quick response type automatic sprinklers. Provide fusible links for 165°F unless otherwise indicated.

2.11.1 Sprinkler Types

Upright.
Pendant.
Concealed pendent.
Extended Coverage Pendent-20x20 Maximum Coverage Area (Classrooms Only)

2.11.2 Finish: chrome-plated for concealed heads in occupied areas. Chrome- plated for pendant heads in exposed occupied areas. Cast brass for unoccupied areas.

2.11.3 Sprinkler Cabinet and Wrench: Furnish steel, baked red enameled, sprinkler box with capacity to store 10 sprinklers and wrench sized to sprinklers.

2.11.4 Acceptable Manufacturers: Subject to compliance with requirements, provide automatic sprinklers of one of the following:

Central Sprinkler Corp.
Grinnell Fire Protection Systems Co., Inc.
Star Sprinkler Mfg. Co. Inc.
Reliable
Viking Corp.
Tyco

3 EXECUTION

3.1 General: Examine areas and conditions under which fire protection materials and products are

to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer. Any installation, modification, or alteration of the sprinkler system shall be performed only by a person under a certificate of competency issued by the State Fire Marshal.

3.2 Installation of Basic Identification: Install mechanical identification in accordance with Division-23 Basic Mechanical Materials and Methods section "Mechanical Identification." Install fire protection signs on piping in accordance with NFPA 13 requirements. Continuously paint exposed fire piping red in mechanical and electrical rooms.

3.3 Installation of Pipes and Pipe Fittings:

3.3.1 General: Install pipes and pipe fittings in accordance with Division-23 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings."

3.3.2 Comply with requirements of NFPA 13 for installation of fire protection piping materials. Install piping products where indicated, in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that piping systems comply with requirements and serve intended purposes.

3.3.3 Coordinate with other work as necessary to interface components of fire protection piping properly with other work.

3.3.4 Install drain piping at low points of piping system. Provide dry drum drips where indicated.

3.3.5 Install sectional valves in inlet piping, at bottom of each riser, and in loops as indicated.

3.3.6 Install water flow indicators where indicated.

3.3.7 Mount supervisory switches on each sectional valve.

3.3.8 Install pressure gauges where required and at top of each standpipe.

3.3.9 Install manual shutoff at each audible alarm station.

3.3.10 Install valved hose connections of sizes indicated, or ¾" size if not otherwise indicated, on sprinkler at ends of branch lines and cross mains and at locations where indicated. The intent is to meet the requirements of NFPA 13 and to achieve a fully drainable system.

3.3.13 Install Inspector's test connection where indicated, or at most remote point from riser.

3.4 Installation of Piping Specialties: Install piping specialties in accordance with Division-23 Basic Mechanical Materials and Methods section "Piping Specialties."

3.5 Installation of Supports and Anchors: Install supports and anchors, in accordance with Division-23 Basic Mechanical Materials and Methods section, "Supports and Anchors."

3.6 Installation of Valves: Install valves in accordance with Division-23 Basic Materials and

Methods section "Valves." Provide valves to isolate each riser and elsewhere as required by NFPA 13 .

3.7 Installation of Meters and Gauges: Install meters and gauges in accordance with Division-23 Basic Mechanical Materials and Methods section "Meters and Gauges."

3.8 Installation of Fire Protection Specialties: Install fire protection specialties as indicated, and in accordance with NFPA 13. Furnish wiring requirements to electrical Installer for electrical wiring of supervisory switches.

3.9 Field Quality Control:

3.9.1 Sprinkler Piping Flushing: Prior to connecting sprinkler risers for flushing, flush feed mains, lead-in connections and control portions of sprinkler piping. After fire sprinkler piping installation has been completed and before piping is placed in service, flush entire sprinkler system, as required to remove foreign substances, under pressure as specified in NFPA 13. Continue flushing until water is clear, and check to ensure that debris has not clogged sprinklers.

3.9.2 Hydrostatic Testing: After flushing system, test fire sprinkler piping hydrostatically, for period of 24 hours, at not less than 200 psi or at 50 psi in excess of maximum static pressure when maximum static pressure is in excess of 150 psi. Check system for leakage of joints. Measure hydrostatic pressure at low point of each system or zone being tested.

3.9.3 Repair or replace piping system as required to eliminate leakage in accordance with NFPA standards for "little or no leakage" and retest as specified to demonstrate compliance.

3.10 Cleaning and Inspecting: Clean and inspect fire protection systems in accordance with requirements of Division-23 Basic Mechanical Materials and Methods section "Testing, Cleaning, and Sterilization of Piping Systems".

3.11 Extra Stock:

3.11.1 Heads: For each style and temperature range required, furnish additional sprinkler heads, amounting to one unit for every 100 installed units, but not less than 5 units of each.

3.11.2 Wrenches: Furnish 2 spanner wrenches for each type and size of valve connection and fire hose coupling. Obtain receipt from Owner that extra stock has been received.

3.12 Owner Instruction: Provide technical services for one 4-hour period to instruct Owner's personnel in operation and maintenance of building sprinkler systems. Schedule training date with Owner. Provide at least 7-day notice to Engineer and Owner of training date.

END OF SECTION 211300

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SECTION 220100 - PLUMBING GENERAL

1 GENERAL

1.1 The work covered by this division consists of providing all labor, equipment and materials and performing all operations necessary for the installation of the plumbing work as herein called for and shown on the drawings.

1.2 Related Documents:

1.2.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2.2 This is a Basic Plumbing Requirements Section. Provisions of this section apply to work of all Division-22 sections. Provisions of Division-23 Basic Mechanical Requirements Sections apply to work of all Division-22 sections.

1.2.3 Review all other contract documents to be aware of conditions affecting work herein.

1.2.4 Definitions:

1.2.4.1 Provide: Furnish and install, complete and ready for intended use.

1.2.4.2 Furnish: Supply and deliver to project site, ready for subsequent requirements.

1.2.4.3 Install: Operations at project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar requirements.

1.3 Permits and Fees: Contractor shall obtain all necessary permits, meters, and inspections required for his work and pay all fees and charges incidental thereto.

1.4 Verification of Owner's Data: Prior to commencing any work the Contractor shall satisfy himself as to the accuracy of all data as indicated in these plans and specifications and/or as provided by the Owner. Should the Contractor discover any inaccuracies, errors, or omissions in the data, he shall immediately notify the Architect/Engineer in order that proper adjustments can be anticipated and ordered. Commencement by the Contractor of any work shall be held as an acceptance of the data by him after which time the Contractor has no claim against the Owner resulting from alleged errors, omissions or inaccuracies of the said data.

1.5 Delivery and Storage of Materials: Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. All material shall be stored to provide protection from the weather and accidental damage.

1.6 Extent of work is indicated by the drawings, schedules, and the requirements of the specifications. Singular references shall not be constructed as requiring only one device if multiple devices are shown on the drawings or are required for proper system operation.

1.7 Field Measurements and Coordination:

1.7.1 The intent of the drawings and specifications is to obtain a complete and satisfactory installation. Separate divisional drawings and specifications shall not relieve the Contractor or

subcontractors from full compliance of work of his trade indicated on any of the drawings or in any section of the specifications.

1.7.2 Verify all field dimensions and locations of equipment to insure close, neat fit with other trades' work. Make use of all contract documents and approved shop drawings to verify exact dimension and locations.

1.7.3 Coordinate work in this division with all other trades in proper sequence to insure that the total work is completed within contract time schedule and with a minimum cutting and patching.

1.7.4 Locate all apparatus symmetrical with architectural elements. Install to exact height and locations when shown on architectural drawings. When locations are shown only on plumbing drawings, be guided by architectural details and conditions existing at job and correlate this work with that of others.

1.7.5 Install work as required to fit structure, avoid obstructions, and retain clearance, headroom, openings and passageways. Cut no structural members without written approval.

1.7.6 Carefully examine any existing conditions, piping, and premises. Compare drawings with existing conditions. Report any observed discrepancies. It shall be the Contractor's responsibility to properly coordinate the work and to identify problems in a timely manner. Written instructions will be issued to resolve discrepancies.

1.7.7 Because of the small scale of the drawings, it is not possible to indicate all offsets and fittings or to locate every accessory. Drawings are essentially diagrammatic. Study carefully the sizes and locations of structural members, wall and partition locations, trusses, and room dimensions and take actual measurements on the job. Locate piping, ductwork, equipment and accessories with sufficient space for installing and servicing. Contractor is responsible for accuracy of his measurements and for coordination with all trades. Contractor shall not order materials or perform work without such verification. No extra compensation will be allowed because field measurements vary from the dimensions on the drawings. If field measurements show that equipment or piping cannot be fitted, the Architect/Engineer shall be consulted. Remove and relocate, without additional compensation, any item that is installed and is later found to encroach on space assigned to another use.

1.8 Guarantee:

1.8.1 The Contractor shall guarantee labor, materials and equipment for a period of one (1) year from Final Completion, or from Owner's occupancy, whichever is earlier. Contractor shall make good any defects and shall include all necessary adjustments to and replacement of defective items without expense to the Owner.

1.8.2 Owner reserves right to make emergency repairs as required to keep equipment in operation without voiding Contractor's Guarantee Bond nor relieving Contractor of his responsibilities during guarantee period.

1.9 Approval Submittals:

1.9.1 When approved, the submittal control log and submittals shall be an addition to the specifications herewith, and shall be of equal force in that no deviation will be permitted except with the approval of the Architect/Engineer.

1.9.1.1 Shop drawings, product literature, and other approval submittals will only be reviewed if they are submitted in full accordance with the General and Supplementary Conditions and Division 1 Specification sections and the following.

1.9.1.1.1 Submittals shall be properly organized in accordance with the approved submittal control log.

1.9.1.1.2 Submittals shall not include items from more than one specification section in the same submittal package unless approved in the submittal control log.

1.9.1.1.3 Submittals shall be properly identified by a cover sheet showing the project name, Architect and Engineer names, submittal control number, specification section, a list of products or item names with model numbers in the order they appear in the package, and spaces for approval stamps. A sample cover sheet is included at the end of this section.

1.9.1.1.4 Submittals shall have been reviewed and approved by the General Contractor (or Prime Contractor). Evidence of this review and approval shall be an "Approved" stamp with a signature and date on the cover sheet.

1.9.1.1.5 Submittals that include a series of fixtures or devices (such as plumbing fixtures or valves) shall be organized by the fixture number or valve type and be marked accordingly. Each fixture must include all items associated with that fixture regardless of whether or not those items are used on other fixtures.

1.9.1.1.6 The electrical design shown on the drawings supports the plumbing equipment basis of design specifications at the time of design. If plumbing equipment is submitted with different electrical requirements, it is the responsibility of the plumbing contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the plumbing submittal with a written statement that this change will be provided at no additional cost. Plumbing submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost.

1.9.2 If the shop drawings show variation from the requirements of contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variation in writing in his letter of transmittal and on the submittal cover sheet in order that, if acceptable, Contractor will not be relieved of the responsibility for executing the work in accordance with the contract.

1.9.3 Review of shop drawings, product literature, catalog data, or schedules shall not relieve the Contractor from responsibility for deviations from contract drawings or specifications, unless he has in writing called to the attention of the Architect/Engineer each such deviation in writing at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop drawings, product literature, catalog data, or schedules. Any feature or function specified but not mentioned in the submittal shall be assumed to be included per the specification.

1.9.4 Submit shop drawings as called for in other sections after award of the contract and before any material is ordered or fabricated. Shop drawings shall consist of plans, sections, elevations and details to scale (not smaller than ¼" per foot), with dimensions clearly showing the installation. Direct copies of small scale project drawings issued to the Contractor are not acceptable. Drawings shall take into account equipment furnished under other sections and shall show space allotted for it. Include construction details and materials.

1.10 Test Reports and Verification Submittals: Submit test reports, certifications and verification letters as called for in other sections. Contractor shall coordinate the required testing and

documentation of system performance such that sufficient time exists to prepare the reports, submit the reports, review the reports and take corrective action within the scheduled contract time.

1.11 O&M Data Submittals: Submit Operation and Maintenance data as called for in other sections. When a copy of approval submittals is included in the O&M Manual, only the final "Approved" or "Approved as Noted" copy shall be used. Contractor shall organize these data in the O&M Manuals tabbed by specification number. Prepare O&M Manuals as required by Division 1 and as described herein.. Submit manuals at the Substantial Completion inspection.

2 PRODUCTS

2.1 All materials shall be new or Owner-supplied reused as shown on the drawings, the best of their respective kinds, suitable for the conditions and duties imposed on them at the building and shall be of reputable manufacturers. The description, characteristics, and requirements of materials to be used shall be in accordance with qualifying conditions established in the following sections.

2.2 Equipment and Materials:

2.2.1 Shall be new and the most suitable grade for the purpose intended. Equipment furnished under this division shall be the product of a manufacturer regularly engaged in the manufacture of such items for a period of three years. Where practical, all of the components shall be products of a single manufacturer in order to provide proper coordination and responsibility. Where required, Contractor shall furnish proof of installation of similar units or equipment.

2.2.2 Each item of equipment shall bear a name plate showing the manufacturer's name, trade name, model number, serial number, ratings and other information necessary to fully identify it. This plate shall be permanently mounted in a prominent location and shall not be concealed, insulated or painted.

2.2.3 The label of the approving agency, such as UL, IBR, ASME, ARI, AMCA, by which a standard has been established for the particular item shall be in full view.

2.2.4 The equipment shall be essentially the standard product of a manufacturer regularly engaged in the production of such equipment and shall be a product of the manufacturer's latest design.

2.2.5 A service organization with personnel and spare parts shall be available within two hours for each type of equipment furnished.

2.2.6 Install in accordance with manufacturer's recommendations. Place in service by a factory trained representative where required.

2.2.7 Materials and equipment are specified herein by a single or by multiple manufacturers to indicate quality, material and type of construction desired. Manufacturer's products shown on the drawings have been used as basis for design; it shall be the Contractor's responsibility to ascertain that alternate manufacturer's products, or the particular products of named manufacturers, meet the detailed specifications and that size and arrangement of equipment are suitable for installation.

2.2.8 Model Numbers: Catalog numbers and model numbers indicated in the drawings and specifications are used as a guide in the selection of the equipment and are only listed for the contractor's convenience. The contractor shall determine the actual model numbers for

ordering materials in accordance with the written description of each item and with the intent of the drawings and specifications.

2.3 Requests for Substitution:

2.3.1 Where a particular system, product or material is specified by name, consider it as standard basis for bidding, and base proposal on the particular system, product or material specified.

2.3.2 Requests by Contractor for substitution will be considered only when reasonable, timely, fully documented, and qualifying under one or more of the following circumstances.

2.3.2.1 Required product cannot be supplied in time for compliance with Contract time requirements.

2.3.2.2 Required product is not acceptable to governing authority, or determined to be non-compatible, or cannot be properly coordinated, warranted or insured, or has other recognized disability as certified by Contractor.

2.3.2.3 Substantial cost advantage is offered Owner after deducting offsetting disadvantages including delays, additional compensation for redesign, investigation, evaluation and other necessary services and similar considerations.

2.3.3 All requests for substitution shall contain a "Comparison Schedule" and clearly and specifically indicate any and all differences or omissions between the product specified as the basis of design and the product proposed for substitution. Differences shall include but shall not be limited to data as follows for both the specified and substituted products:

Principal of operation.
Materials of construction or finishes.
Thickness of gauge of materials.
Weight of item.
Deleted features or items.
Added features or items.
Changes in other work caused by the substitution.
Performance curves.

If the approved substitution contains differences or omissions not specifically called to the attention of the Architect/Engineer, the Owner reserves the right to require equal or similar features to be added to the substituted products (or to have the substituted products replaced) at the Contractor's expense.

3 EXECUTION

3.1 Workmanship: All materials and equipment shall be installed and completed in a first-class workmanlike manner and in accordance with the best modern methods and practice. Any materials installed which do not present an orderly and reasonably neat and/or workmanlike appearance, or do not allow adequate space for maintenance, shall be removed and replaced when so directed by the Architect/Engineer.

3.2 Coordination:

3.2.1 The Contractor shall be responsible for full coordination of the plumbing systems with shop drawings of the building construction so the proper openings and sleeves or supports are provided for piping, ductwork, or other equipment passing through slabs or walls.

3.2.2 Any additional steel supports required for the installation of any plumbing equipment, piping, or ductwork shall be furnished and installed under the section of the specifications requiring the additional supports.

3.2.3 It shall be the Contractor's responsibility to see that all equipment such as valves, dampers, filters and such other apparatus or equipment that may require maintenance and operation are made easily accessible, regardless of the diagrammatic location shown on the drawings.

3.2.4 All connections to fixtures and equipment shown on the drawings shall be considered diagrammatic unless otherwise indicated by detail. The actual connections shall be made to fully suit the requirements of each case and adequately provide for expansion and servicing.

3.2.5 The contractor shall protect equipment, material, and fixtures at all times. He shall replace all equipment, material, and fixtures which are damaged as a result of inadequate protection.

3.2.6 Prior to starting and during progress of work, examine work and materials installed by others as they apply to work in this division. Report conditions which will prevent satisfactory installation.

3.2.7 Start of work will be construed as acceptance of suitability of work of others.

3.3 Interruption of Service: Before any equipment is shut down for disconnecting or tie-ins, arrangements shall be made with the Architect/Engineer and this work shall be done at the time best suited to the Owner. This will typically be on weekends and/or holidays and/or after normal working hours. Services shall be restored the same day unless prior arrangements are made. All overtime or premium costs associated with this work shall be included in the base bid.

3.4 Phasing: Provide all required temporary valves, piping, ductwork, equipment and devices as required. Maintain temporary services to areas as required. Remove all temporary material and equipment on completion of work unless Engineer concurs that such material and equipment would be beneficial to the Owner on a permanent basis.

3.5 Cutting and Patching: Notify General Contractor to do all cutting and patching of all holes, chases, sleeves, and other openings required for installation of equipment furnished and installed under this section. Utilize experienced trades for cutting and patching. Obtain permission from Architect/Engineer before cutting any structural items.

3.6 Equipment Setting: Bolt equipment directly to concrete pads or vibration isolators as required, using hot-dipped galvanized anchor bolts, nuts and washers. Level equipment.

3.7 Painting: Touch-up factory finishes on equipment located inside and outside shall be done under Division 22. Obtain matched color coatings from the manufacturer and apply as directed. If corrosion is found during inspection on the surface of any equipment, clean, prime, and paint, as required.

3.8 Clean-up: Thoroughly clean all exposed parts of apparatus and equipment of cement, plaster, and other materials and remove all oil and grease spots. Repaint or touch up as required to look like new. During progress of work, contractor is to carefully clean up and leave premises and all portions of building free from debris and in a clean and safe condition.

3.9 Start-up and Operational Test: Start each item of equipment in strict accordance with the manufacturer's instructions; or where noted under equipment specification, start-up shall be

done by a qualified representative of the manufacturer. Alignment, lubrication, safety, and operating control shall be included in start-up check.

3.10 Record Drawings:

3.10.1 During the progress of the work the Contractor shall record on their field set of drawings the exact location, as installed, of all piping, ductwork, equipment, and other systems which are not installed exactly as shown on the contract drawings.

3.10.2 Upon completion of the work, record drawings shall be prepared as described in the General Conditions, Supplementary Conditions, and Division 1 sections.

3.11 Acceptance:

3.11.1 Punch List: Submit written confirmation that all punch lists have been checked and the required work completed.

3.11.2 Instructions: At completion of the work, provide a competent and experienced person who is thoroughly familiar with project, for one day to instruct permanent operating personnel in operation of equipment and control systems. This is in addition to any specific equipment operation and maintenance training.

3.11.3 Operation and Maintenance Manuals: Furnish four complete manuals bound in ring binders with Table of Contents, organized, and tabbed by specification section. Manuals shall contain:

Detailed operating instructions and instructions for making minor adjustments.
Complete wiring and control diagrams.
Routine maintenance operations.
Manufacturer's catalog data, service instructions, and parts lists for each piece of operating equipment.
Copies of approved submittals.
Copies of all manufacturer's warranties.
Copies of test reports and verification submittals.

3.11.4 Record Drawings: Submit record drawings.

3.11.5 Control Diagrams: Frame under glass and mount on equipment room wall.

END OF SECTION 220100

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SECTION 220700 - INSULATION FOR PLUMBING EQUIPMENT AND PIPING

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-22 Basic Plumbing Materials and Methods Sections apply to work of this section.

1.3 Division-23 Basic Mechanical Materials and Methods Sections apply to work of this section.

1.4 Approval Submittals:

1.4.1 Product Data: Submit a producer's data sheets and installation instructions on each insulation system including insulation, coverings, adhesives, sealers, protective finishes, and other material recommended by the manufacturer for applications indicated. Submit for:

Fiberglass pipe insulation
Cellular glass pipe below grade insulation

1.5 O&M Data Submittals: Submit a copy of all approval submittals. Include in O&M Manual.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide insulation products by Armstrong, Johns Manville, Knauf, Owens Corning, Pittsburgh Corning, U.S. Rubber, or approved equal. All products shall be asbestos-free.

2.2 Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics, and adhesive) with a flame-spread rating of 25 or less, and a smoke-developed rating of 50 or less, as tested by ANSI/ASTM E84.

2.3 Pipe Insulation Materials:

2.3.1 Fiberglass Pipe Insulation: ASTM C547, Class 1 unless otherwise indicated. (Preformed sleeving with white all-service jacket, suitable for temperatures up to 450°F)

2.3.2 Cellular Glass Pipe Insulation: ASTM C552, Type II, Class 1. (Uncovered.)

2.3.3 Flexible Unicellular Pipe Insulation: ASTM C534, Type I. (Tubular, suitable for use to 200ºF.)

2.3.4 Staples, Bands, Wires, and Cement: As recommended by the insulation manufacturer for applications indicated.

2.3.5 Adhesives, Sealers, Protective Finishes: Products recommended by the insulation manufacturer for the application indicated.

2.3.6 Jackets: ASTM C921, Type I (vapor barrier) for piping below ambient temperature, Type II (vapor permeable) for piping above ambient temperature. Type I may be used for all piping at Installer's option.

3 EXECUTION

3.1 General:

3.1.1 Install thermal insulation products in accordance with manufacturer's written instructions, and in compliance with recognized industry practices to ensure that insulation serves intended purpose.

3.1.2 Install insulation materials with smooth and even surfaces and on clean and dry surfaces. Redo poorly fitted joints. Do not use mastic or joint sealer as filler for gapping joints and excessive voids resulting from poor workmanship.

3.1.3 Maintain integrity of vapor-barrier on insulation and protect it to prevent puncture and other damage. Label all insulation "ASBESTOS FREE".

3.1.4 Do not apply insulation to surfaces while they are hot or wet.

3.1.5 Do not install insulation until systems have been checked and found free of leaks. Surfaces shall be clean and dry before attempting to apply insulation. A professional insulator with adequate experience and ability shall install insulation.

3.1.6 Do not install insulation on pipe systems until acceptance tests have been completed except for flexible unicellular insulation. Do not install insulation until the building is "dried-in".

3.2 Fiberglass Pipe Insulation:

3.2.1 Insulate the following piping systems (indoor locations):

3.2.1.1 Domestic hot water, 180° F: up to 2" pipe - 1½" thick, over 2" pipe 2" thick.

3.2.1.2 Domestic hot and tempered water, 140° F: up to 3" pipe - 1½" thick, over 3" pipe - 2" thick.

3.2.2 Apply insulation to pipe with all side and end joints butted tightly. Seal longitudinal lap by pressurizing with plastic sealing tool. Apply 3 inch wide self sealing butt strips to joints between insulation sections. Insulate all fittings, flanges, valves and strainers with premolded insulation. Apply coat of insulating cement to fittings and wrap with glass cloth overlapping each wrap 1" and adjacent pipe 2". Finish with heavy coat of general purpose mastic. Premolded PVC covers may also be used, but no flexible inserts are allowed.

3.2.3 Provide hanger or pipe support shields of 16 gauge (minimum) galvanized steel over the insulation which extends halfway up the pipe insulation cover and at least 6" on each side of the hanger.

3.2.4 Omit insulation on exposed plumbing fixture runouts from faces of wall or floor to fixture; on unions, flanges, strainer blowoffs, flexible connections and expansion joints.

3.3 Cellular Glass Pipe Insulation (Underground):

3.3.1 Insulate the following piping systems:

3.3.1.1 Domestic hot water: smaller than 6" pipe -1½" thick, 6" and larger pipe -2" thick.

3.3.1.2 Domestic hot water return: smaller than 6" pipe -1½" thick, 6" and larger pipe -2" thick

3.3.2 Cut insulation in sections at fittings and carefully fit to the pipe and fittings. No stovepipe or single miter insulation is allowed. Apply vapor barrier mastic to all edges of the cellular insulation and between joints in the insulation. Wire the cellular glass in place with stainless

steel wire 9 inches on center. Finish with a prefabricated water barrier self-sealing jacket similar to Pittsburg Corning “Pittwrap SSII”, 70 mils thickness. Insulate all anchors, guides, wall penetrations, expansion joints, loops and ells in accordance with the manufacturer's recommendations. Use rubber spacers at all expansion fittings.

END OF SECTION 220700

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SECTION 221113 - POTABLE WATER SYSTEM

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-22 Basic Plumbing Requirements and Basic Plumbing Materials and Methods sections apply to work of this section.

1.3 Division-23 Basic Mechanical Materials and Methods Sections apply to work of this section.

1.4 Extent of potable water systems work, is indicated on drawings and schedules, and by requirements of this section.

1.5 Refer to other Division-22 sections for site water distribution system; not work of this section unless noted.

1.6 Refer to appropriate Division-2 sections for exterior potable water system; not work of this section unless noted.

1.7 Insulation for potable water piping is specified in other Division-22 sections, and is included as work of this section. Insulation requirements include:

1.7.1 Domestic hot water piping
1.7.2 Domestic hot water return piping
1.7.3 Domestic cold water piping

1.8 Excavation and backfill required in conjunction with water piping is specified in other Division-23 sections, and is included as work of this section.

1.9 Code Compliance: Comply with applicable portions of Florida Building Code-Plumbing pertaining to selection and installation of plumbing materials and products. Comply with local utility requirements.

1.10 Approval Submittals:

1.10.1 Product Data: Submit manufacturer's technical product data and installation instructions for:

Valves
Wall hydrants
Water hammer arresters

1.11 Test Reports and Verification Submittals:

1.11.1 Disinfection: Submit report by Health Department.

1.12 O&M Data Submittals: Submit a copy of all approval submittals. Submit maintenance data and parts lists for valves. Include these data in O&M manual.

2 PRODUCTS

2.1 General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with Florida Building Code-Plumbing where applicable. Provide sizes and types matching pipe materials used in potable water systems. Where more than one type of materials or products is indicated, selection is Installer's option.

2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following listed for each item.

2.3 Identification: Provide identification complying with Division-23 Basic Mechanical Materials and Methods section "Mechanical Identification". Provide manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, intended for direct burial service; not less than 6" wide x 4 mils thick. Provide blue tape with black printing reading "CAUTION WATER LINE BURIED BELOW".

2.4 Pipes and Fittings: Provide pipes and pipe fittings complying with Division-22 Basic Plumbing Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing:

2.4.1 Interior Water Piping:

2.4.1.1 Above Grade: Copper tube; Type L, hard-drawn temper; wrought-copper fittings, solder-joints.

2.4.1.2 Below Grade: Copper tube; Type L, soft-annealed temper; no joints below floor.

2.4.2 Exterior Water Piping:

2.4.2.1 Copper tube; Type L, hard-drawn temper; wrought-copper fittings, solder-joints.

2.4.3 Solder joints shall be made with 95-5 solder.

2.5 Piping Specialties: Provide piping specialties complying with Division-22 Basic Plumbing Materials and Methods section "Piping Specialties".

2.6 Supports and Anchors: Provide supports and anchors complying with Division-22 Basic Plumbing Materials and Methods section "Supports and Anchors".

2.7 Interior Valves: Provide valves complying with Division-22 Basic Plumbing Materials and Methods section "Valves", in accordance with the following listing:

2.7.1 Sectional and Shutoff Valves: GA1, GA2, GA3, BA1, BA2.

2.7.2 Drain Valves: GA1, GA2, BA1, BA2.

2.7.3 Throttling Valves: BA1, BA2.

2.7.4 Check Valves: CK1, CK2, CK3.

2.8 Wall Hydrants: Provide complete bronze body hose bibbs inside stainless steel box with hinged access door with cylinder lock and “WATER” stamped on cover. Provide key operated control valve with all bronze interior parts, replaceable seat washer, screwdriver operated stop valve in supply, and 3/4” male threaded hose connection. Zurn Z1350 or equal by Acorn or

Woodford.

2.9 Water Hammer Arresters: Provide bellows type water hammer arresters, stainless steel casing and bellows, pressure rated for 250 psi, tested and certified in accordance with PDI Standard WH-201. Precision Plumbing Products, Josam, Zurn, Amtrol, Wade, Jay R. Smith, or approved equal.

3 EXECUTION

3.1 General: Examine areas and conditions under which potable water systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Install plumbing identification in accordance with Division-23 Basic Mechanical Materials and Methods section "Mechanical Identification". Install underground plastic pipe markers during backfill, 6"-8" below grade.

3.3 Install water distribution piping in accordance with Division-23 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings".

3.3.1 Install piping with 1/32" per foot (¼%) downward slope towards drain point.

3.3.2 Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.

3.4 Install exterior water piping in compliance with local governing regulations. Water piping shall be installed with a minimum of 30 inches of cover unless otherwise indicated.

3.5 Install piping specialties in accordance with Division-23 Basic Mechanical Materials and Methods section "Piping Specialties".

3.6 Install supports and anchors in accordance with Division-23 Basic Mechanical Materials and Methods section "Supports and Anchors".

3.7 Install valves in accordance with Division-23 Basic Mechanical Materials and Methods section "Valves".

3.7.1 Sectional Valves: Install on each branch and riser, close to main, where branch or riser serves two or more plumbing fixtures or equipment connections, and elsewhere as indicated.

3.7.2 Shutoff Valves: Install on inlet of each plumbing equipment item, and on inlet of each plumbing fixture, and elsewhere as indicated.

3.7.3 Drain Valves: Install on each plumbing equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each rise or drop in piping system, and elsewhere where indicated or required to completely drain potable water system.

3.7.4 Check Valves: Install where indicated.

3.8 Hose Bibbs and Wall Hydrants: Install on concealed piping where indicated with vacuum breaker. Mount 18 inches above grade or finished floor.

3.9 Install meters and gauges in accordance with Division-23 Basic Mechanical Materials and Methods section "Meters and Gauges".

3.10 Install relief valves on each water heater, and where indicated in accordance with the manufacturer's instructions. Pipe full size outside or to floor drain. Cut the end of the pipe at a 45° angle and terminate 6 inches above the floor or grade.

3.11 Piping Runouts to Fixtures: Provide hot and cold water piping runouts to fixtures of sizes indicated, but in no case smaller than required by Florida Building Code-Plumbing.

3.12 Plumbing Equipment Connections: Connect hot and cold water piping system to plumbing equipment as indicated, and comply with equipment manufacturer's installation instructions. Provide shutoff valve and union for each connection, provide drain valve on drain connection.

3.13 Install water hammer arresters in upright position, in locations and of sizes indicated in accordance with PDI Standard WH-201.

3.14 Locate all valves and devices requiring access above lay-in ceiling.

3.15 Piping Tests: Test, clean, and sterilize potable water piping in accordance with testing requirements of Division-23 Basic Mechanical Materials and Methods section "Testing, Cleaning, and Sterilization of Piping Systems".

END OF SECTION 221113

SECTION 221316 - SOIL, WASTE AND VENT SYSTEM

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-22 Basic Plumbing Requirements and Basic Plumbing Materials and Methods sections apply to work of this section.

1.3 Division-23 Basic Mechanical Materials and Methods Sections apply to work of this section.

1.4 Extent of soil waste and vent systems work is indicated on drawings and schedules, and by requirements of this section.

1.5 Refer to appropriate Division-2 sections for exterior sanitary sewer system required in conjunction with soil and waste systems; not work of this section.

1.6 Excavation and backfill required in conjunction with soil, waste and vent piping is specified in other Division-23 sections and is included as work of this section.

1.7 Refer to Division-7 section "Flashing and Sheet Metal" for flashings required in conjunction with soil and waste systems; not work of this section.

1.8 Code Compliance: Comply with applicable portions of Florida Building Code-Plumbing pertaining to plumbing materials, construction and installation of products. Comply with local utility requirements.

1.9 Approval Submittals:

1.9.1 Product Data: Submit manufacturer's technical product data for:

Cleanouts
Trench drains

2 PRODUCTS

2.1 General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in soil and waste systems. Where more than one type of materials or products is indicated, selection is Installer's option.

Underground-Type Plastic Line Marker: Manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, intended for direct-burial service; not less than 6" wide x 4 mils thick. Provide green tape with black printing reading "CAUTION SEWER LINE BURIED BELOW".

2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following listed for each item.

2.3 Pipes and Fittings: Provide pipes and pipe fittings complying with Division-23 Basic Mechanical

Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing:

2.3.1 Above Ground Soil, Waste, and Vent Piping:

2.3.1.1 Polyvinyl chloride plastic pipe (PVC); Type DWV; PVC plastic type DWV socket-type fitting, solvent cement joints. Do not use in fire-rated assemblies or return air plenums.

2.3.2 Underground Building Drain Piping (within 5 feet of the building):

2.3.2.1 Pipe Size 6" and Smaller: Polyvinyl chloride sewer pipe (PVC); Type DWV; PVC plastic type DWV socket-type.

2.4 Pipe Specialties: Provide piping specialties complying with Division-23 Basic Mechanical Materials and Methods section "Piping Specialties".

2.5 Supports and Anchors: Provide supports and anchors complying with Division-23 Basic Mechanical Materials and Methods section "Supports and Anchors".

2.6 Cleanouts: Provide factory-fabricated drainage piping products of size and type indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements and governing regulations. Josam, Jay R. Smith, Wade, Zurn.

2.6.1 Cleanout Plugs: Cast-bronze or brass, threads complying with ANSI B2.1 countersunk head.

2.6.2 Cleanout for PVC Systems:

2.6.2.1 Floor Cleanouts: Cast-iron body with adjustable head, brass plug, and scoriated nick-brass cover. Furnish with carpet flange for carpeted floors. Furnish with recessed cover for tile floors. Furnish with clamping ring for floors with membrane. Wade W-6030 hub outlet for push-on.

2.6.2.2 Cleanouts in Piping: PVC cleanout adaptor with threaded PVC plug.

2.6.2.3 Wall Cleanouts: PVC cleanout adaptor with tapped, countersunk, threaded brass plug. Square 9”x9” wall access cover, with scoriated nickel bronze finish.

2.6.2.4 Grade Cleanouts: PVC cleanout adaptor with countersunk, threaded brass plug. Wade W-8590-D plug. In sidewalks and other finished concrete, provide access cover frames with a non-tilting tractor cover. Wade W-7035-Z or equal.

2.6.2.5 Cleanouts in Paved Areas: Cast iron body, adjustable housing, ferrule with plug and round loose scoriated tractor cover. Wade W-8300-MF. Coordinate concrete depth at site with adjustable flange.

2.7 Trench Drain: Provide trench drains of modular channels constructed of HDPE with ductile iron heavy-duty heel-proof slotted grates with total dimensions of 12” wide x 24’-0” long. Channels shall be interlocking with a mechanical lock into concrete surround every 12”. Channels shall have a smooth radiused self cleaning bottom and 1.04% slope. Basis of design: Zurn Z882.

3 EXECUTION

3.1 Examine substrates and conditions under which soil and waste systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 Piping Installation:

3.2.1 Install above grade soil and waste piping in accordance with Division-23 Basic Plumbing Materials and Methods section "Pipes and Pipe Fittings", and with Florida Building Code-Plumbing.

3.2.2 Install underground soil and waste pipes as indicated and in accordance with Florida Building Code-Plumbing. Lay underground piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Clean interior of piping of dirt and other superfluous material as work progresses. Maintain swab or drag in line and pull past each joint as it is completed. Place plugs in ends of uncompleted piping at end of day or whenever work stops.

3.2.3 Install building soil and vent piping pitched to drain at minimum slope of ¼" per foot (2%) for piping smaller than 3", and 1/8" per foot (1%) for piping 3" and larger.

3.3 Install piping specialties in accordance with Division-23 Basic Mechanical Materials and Methods section "Piping Specialties".

3.4 Install supports and anchors in accordance with Division-23 Basic Mechanical Materials and Methods section "Supports and Anchors".

3.5 Installation of Cleanouts: Install in above ground piping and building drain piping as indicated, as required by Florida Building Code-Plumbing; and at each change in direction of piping greater than 45°; at minimum intervals of 50' for piping 4" and smaller and 100' for larger piping; and at base of each vertical soil or waste stack. Install floor and wall cleanout covers for concealed piping, select type to match adjacent building finish.

3.5.1 Size: Cleanouts shall be full size up to 4". Piping over 4" shall have a reducing fitting to accommodate a 4" cleanout unless indicated otherwise on drawings.

3.5.2 Install cleanouts to allow adequate clearance for rodding.

3.5.3 Protect all finished surfaces of cleanouts with a suitable adhesive covering until construction is completed.

3.5.4 Cleanouts to Grade: Provide an 18" x 18" x 8" thick concrete pad around the cleanout. Set the cleanout ferrule, adapter, or access cover frame in the concrete as required. The cleanout shall be extended to the finished grade. The concrete pad shall slope away from the cleanout in all directions approximately one inch. Cover pad with fill to finished grade.

3.5.5 Cleanouts in Paved Areas: Provide concrete pad similar to cleanout to grade and coordinate concrete depth at site with adjustable flange. Access cover frames are required.

3.6 Flashing Flanges: Install flashing flange and clamping device with each stack and cleanout passing through waterproof membranes.

3.7 Vent Flashing Sleeves: Install on stack passing through roof, secure to stack flashing in accordance with manufacturer’s instructions. For metal roofs, sleeves and flashing are by Division-7.

3.8 Piping Runouts to Fixtures: Provide soil and waste piping runouts to plumbing fixtures and

drains, with approved trap, of sizes indicated, but in no case smaller than required by Florida Building Code-Plumbing.

3.9 Test, clean, flush, and inspect soil and waste piping in accordance with requirements of Division-23 Basic Mechanical Materials and Methods section "Testing, Cleaning and Sterilization of Piping Systems".

END OF SECTION 221316

SECTION 22 14 00 - STORM WATER SYSTEM

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division 23 Basic Mechanical Requirements and Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of storm water systems work, is indicated on drawings and by requirements of this section.

1.4 Refer to appropriate Division-2 sections for exterior storm sewer system required in conjunction with storm water systems; not work of this section.

1.5 Insulation for storm water systems is specified in other Division 22 sections, and is included as work of this section. Insulation requirements include:

Body of roof drains.
Storm water piping above ceilings.

1.6 Excavation and backfill required in conjunction with storm water piping is specified in other Division 23 sections, and is included as work of this section.

1.7 Refer to Division-7 section "Flashing and Sheet metal" for flashings required in conjunction with storm water systems; not work of this section.

1.8 Code Compliance: Comply with applicable portions of Florida Building Code-Plumbing pertaining to plumbing materials construction and installation of products. Comply with local utility requirements.

1.9 Approval Submittals:

1.9.1 Product Data: Submit manufacturer's technical product data for:

Cleanouts
Roof drains
Backwater valves

1.10 O&M Data Submittals: Submit a copy of all approval submittals. Submit maintenance data and parts lists for backwater valves. Include these data in O&M manual.

2 PRODUCTS

2.1 General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in storm water systems. Where more than one type of materials or products is indicated, selection is Installer's option.

Underground-Type Plastic Line Marker: Manufacturer's standard permanent, bright-colored,

continuous-printed plastic tape, intended for direct-burial service; not less than 6" wide x 4 mils thick. Provide green tape with black printing reading "CAUTION SEWER LINE BURIED BELOW".

2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following listed for each item.

2.3 Pipes and Fittings: Provide pipes and pipe fittings complying with Division 22 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing:

2.3.1 Above Ground Conductor Piping:

2.3.1.1 Cast-iron hub-and-spigot soil pipe; service weight; cast-iron, hub-and-spigot soil pipe fittings, lead and oakum joints.

2.3.1.2 Cast-iron hub-and-spigot soil pipe; service weight; cast-iron, hub-and-spigot soil pipe fittings, compression gasket joints.

2.3.1.3 Hubless cast-iron soil pipe; service weight; hubless cast-iron soil pipe fittings, hubless joints.

2.3.2 Underground Building Drain Piping (within 5 feet of the building):

2.3.2.1 Cast-iron hub-and-spigot soil pipe; service weight; cast-iron hub-and-spigot soil pipe fittings, lead and oakum joints.

2.3.2.2 Cast-iron hub-and-spigot soil pipe; service weight; cast-iron hub-and-spigot soil pipe fittings, compression gasket joints.

2.3.2.3 Polyvinyl chloride plastic pipe (PVC); Type DWV; PVC plastic type DWV socket-type fittings, solvent cement joints.

2.4 Piping Specialties: Provide piping specialties complying with Division 22 Basic Mechanical Materials and Methods section "Piping Specialties".

2.5 Supports and Anchors: Provide supports and anchors, complying with Division 22 Basic Mechanical Materials and Methods section "Supports, and Anchors".

2.6 Cleanouts: Provide factory-fabricated drainage piping products of size and type indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements and governing regulations. Josam, Jay R. Smith, Wade, Zurn.

2.6.1 Cleanout Plugs: Cast-bronze or brass, threads complying with ANSI B2.1, countersunk head.

2.6.2 Cleanouts for Cast-Iron Piping Systems:

2.6.2.1 Cleanouts in Piping: Cast iron cleanout ferrule with threaded brass countersunk plug for caulked piping, Wade W-8550-D. For no-hub piping, furnish no-hub ferrule with W-8590-D threaded brass countersunk plug.

2.6.2.2 Wall Cleanouts: Cast iron ferrule with tapped, countersunk, threaded brass plug and round stainless steel access cover with screw. Wade W-8450-R for caulked joints. No-hub ferrule, Wade W-8590-E plug, and Wade W-8480-R cover for no-hub joints.

2.7 Roof Drains: Provide high performance 16 9/16” diameter roof drains with 12” diameter dome, 4” outlet; and type, including features, as specified herein. Provide products by Josam, Jay R. Smith, Wade, or Zurn. Basis of design: Zurn Z100 FLOFORCE cast iron roof drain with smooth funnel shaped interior surface, adjustable extensions, combination membrane flashing clamp/gravel guard and low silhouette Ploy-Dome. Furnish 36" x 36", 16 oz. copper or 4 lb. sheet lead roof flashing for each drain.

3 EXECUTION

3.1 Examine substrate and conditions under which storm water system is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Piping Installation:

3.2.1 Install above grade storm water piping in accordance with Division 23 Basic Mechanical Materials and Methods section, "Pipes and Pipe Fittings", and with Florida Building Code-Plumbing.

3.2.2 Install underground storm water piping as indicated and in accordance with Florida Building Code-Plumbing. Lay underground storm water piping beginning at low point of systems, true to grade and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Clear interior of piping of dirt and other superfluous material as work progresses. Maintain swab or drag in line and pull past each joint as it is completed. Place plugs in ends of uncompleted piping at end of day or whenever work stops.

3.2.3 Install building storm water piping pitched to drain at minimum slope of 1/8" per foot (1%).

3.3 Install piping specialties in accordance with requirements of Division 23 Basic Mechanical Materials and Methods section "Piping Specialties".

3.4 Install supports and anchors, in accordance with Division 23 Basic Mechanical Materials and Methods section "Supports and Anchors".

3.5 Install expansion joints on vertical risers as indicated, and as required by Florida Building Code-Plumbing.

3.6 Installation of Cleanouts: Install in conductor piping and storm drain piping as indicated, as required by Florida Building Code-Plumbing; at each change in direction of piping greater than 45°; at minimum intervals of 50' for piping 4" and smaller and 100' for larger piping; and at base of each conductor. Install floor and wall cleanout covers for concealed piping, select type to match adjacent building finish.

3.6.1 Size: Cleanouts shall be full size up to 4". Piping over 4" shall have a reducing fitting to accommodate a 4" cleanout unless indicated otherwise on drawings.

3.6.2 Install cleanouts to allow adequate clearance for rodding.

3.6.3 Protect all finished surfaces of cleanouts with a suitable adhesive covering until construction is completed.

3.6.4 Flashing Flanges: Install flashing flange and clamping device with each cleanout passing through waterproof membrane.

3.7 Installation of Roof Drains: Install roof drains in accordance with manufacturer's written instructions and in locations indicated.

3.7.1 Coordinate flashing work with work of roofing, water-proofing and adjoining substrate work.

3.7.2 Coordinate with roofing as necessary to interface roof drains with roofing work.

3.7.3 Install roof drains at low points of surface areas to be drained, or as indicated.

3.7.4 Install drain flashing collar or flange so that no leakage occurs between roof drain and adjoining roofing. Maintain integrity of waterproof membranes, where penetrated.

3.7.5 Position roof drains so that they are accessible and easy to maintain.

3.8 Test, clean, flush, and inspect storm water piping in accordance with requirements of Division 22 Basic Mechanical Materials and Methods section "Testing, Cleaning and Sterilization of Piping Systems".

END OF SECTION 22 14 00

SECTION 230100 - MECHANICAL GENERAL

1 GENERAL

1.1 The work covered by this division consists of providing all labor, equipment and materials and performing all operations necessary for the installation of the mechanical work as herein called for and shown on the drawings.

1.2 Related Documents:

1.2.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2.2 This is a Basic Mechanical Requirements Section. Provisions of this section apply to work of all Division 23 sections.

1.2.3 Review all other contract documents to be aware of conditions affecting work herein.

1.2.4 Definitions:

1.2.4.1 Provide: Furnish and install, complete and ready for intended use.

1.2.4.2 Furnish: Supply and deliver to project site, ready for subsequent requirements.

1.2.4.3 Install: Operations at project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar requirements.

1.3 Permits and Fees: Contractor shall obtain all necessary permits, meters, and inspections required for his work and pay all fees and charges incidental thereto.

1.4 Verification of Owner's Data: Prior to commencing any work the Contractor shall satisfy himself as to the accuracy of all data as indicated in these plans and specifications and/or as provided by the Owner. Should the Contractor discover any inaccuracies, errors, or omissions in the data, he shall immediately notify the Architect/Engineer in order that proper adjustments can be anticipated and ordered. Commencement by the Contractor of any work shall be held as an acceptance of the data by him after which time the Contractor has no claim against the Owner resulting from alleged errors, omissions or inaccuracies of the said data.

1.5 Delivery and Storage of Materials: Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. All material shall be stored to provide protection from the weather and accidental damage.

1.6 Extent of work is indicated by the drawings, schedules, and the requirements of the specifications. Singular references shall not be constructed as requiring only one device if multiple devices are shown on the drawings or are required for proper system operation.

1.7 Field Measurements and Coordination:

1.7.1 The intent of the drawings and specifications is to obtain a complete and satisfactory installation. Separate divisional drawings and specifications shall not relieve the Contractor or subcontractors from full compliance of work of his trade indicated on any of the drawings or in any section of the specifications.

1.7.2 Verify all field dimensions and locations of equipment to insure close, neat fit with other trades' work. Make use of all contract documents and approved shop drawings to verify exact dimension and locations.

1.7.3 Coordinate work in this division with all other trades in proper sequence to insure that the total work is completed within contract time schedule and with a minimum cutting and patching.

1.7.4 Locate all apparatus symmetrical with architectural elements. Install to exact height and locations when shown on architectural drawings. When locations are shown only on mechanical drawings, be guided by architectural details and conditions existing at job and correlate this work with that of others.

1.7.5 Install work as required to fit structure, avoid obstructions, and retain clearance, headroom, openings and passageways. Cut no structural members without written approval.

1.7.6 Carefully examine any existing conditions, piping, and premises. Compare drawings with existing conditions. Report any observed discrepancies. It shall be the Contractor's responsibility to properly coordinate the work and to identify problems in a timely manner. Written instructions will be issued to resolve discrepancies.

1.7.7 Because of the small scale of the drawings, it is not possible to indicate all offsets and fittings or to locate every accessory. Drawings are essentially diagrammatic. Study carefully the sizes and locations of structural members, wall and partition locations, trusses, and room dimensions and take actual measurements on the job. Locate piping, ductwork, equipment and accessories with sufficient space for installing and servicing. Contractor is responsible for accuracy of his measurements and for coordination with all trades. Contractor shall not order materials or perform work without such verification. No extra compensation will be allowed because field measurements vary from the dimensions on the drawings. If field measurements show that equipment or piping cannot be fitted, the Architect/Engineer shall be consulted. Remove and relocate, without additional compensation, any item that is installed and is later found to encroach on space assigned to another use.

1.8 Guarantee:

1.8.1 The Contractor shall guarantee labor, materials and equipment for a period of *five* ~~one~~ (~~1~~ *5*) year*s* from Final Completion, or from Owner's occupancy, whichever is earlier. Contractor shall make good any defects and shall include all necessary adjustments to and replacement of defective items without expense to the Owner.

1.8.2 Owner reserves right to make emergency repairs as required to keep equipment in operation without voiding Contractor's Guarantee Bond nor relieving Contractor of his responsibilities during guarantee period.

1.9 Approval Submittals:

1.9.1 When approved, the submittal control log and submittals shall be an addition to the specifications herewith, and shall be of equal force in that no deviation will be permitted except with the approval of the Architect/Engineer.

1.9.1.1 Shop drawings, product literature, and other approval submittals will only be reviewed if they are submitted in full accordance with the General and Supplementary Conditions and Division 1 Specification sections and the following.

1.9.1.1.1 Submittals shall be properly organized in accordance with the approved submittal control log.

1.9.1.1.2 Submittals shall not include items from more than one specification section in the same submittal package unless approved in the submittal control log.

1.9.1.1.3 Submittals shall be properly identified by a cover sheet showing the project name, Architect and Engineer names, submittal control number, specification section, a list of products or item names with model numbers in the order they appear in the package, and spaces for approval stamps. A sample cover sheet is included at the end of this section.

1.9.1.1.4 Submittals shall have been reviewed and approved by the General Contractor (or Prime Contractor). Evidence of this review and approval shall be an "Approved" stamp with a signature and date on the cover sheet.

1.9.1.1.5 Submittals that include a series of fixtures or devices (such as plumbing fixtures or valves) shall be organized by the fixture number or valve type and be marked accordingly. Each fixture must include <u>all</u> items associated with that fixture regardless of whether or not those items are used on other fixtures.

1.9.1.1.6 The electrical design shown on the drawings supports the mechanical equipment basis of design specifications at the time of design. If mechanical equipment is submitted with different electrical requirements, it is the responsibility of the mechanical contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the mechanical submittal with a written statement that this change will be provided at no additional cost. Mechanical submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost.

1.9.2 If the shop drawings show variation from the requirements of contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variation in writing in his letter of transmittal and on the submittal cover sheet in order that, if acceptable, Contractor will not be relieved of the responsibility for executing the work in accordance with the contract.

1.9.3 Review of shop drawings, product literature, catalog data, or schedules shall not relieve the Contractor from responsibility for deviations from contract drawings or specifications, unless he has in writing called to the attention of the Architect/Engineer each such deviation in writing at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop drawings, product literature, catalog data, or schedules. Any feature or function specified but not mentioned in the submittal shall be assumed to be included per the specification.

1.9.4 Submit shop drawings as called for in other sections after award of the contract and before any material is ordered or fabricated. Shop drawings shall consist of plans, sections, elevations and details to scale (not smaller than ¼" per foot), with dimensions clearly showing the installation. Direct copies of small scale project drawings issued to the Contractor are not acceptable. Drawings shall take into account equipment furnished under other sections and shall show space allotted for it. Include construction details and materials.

1.10 <u>Test Reports and Verification Submittals</u>: Submit test reports, certifications and verification letters as called for in other sections. Contractor shall coordinate the required testing and documentation of system performance such that sufficient time exists to prepare the reports, submit the reports, review the reports and take corrective action within the scheduled contract time.

1.11 O&M Data Submittals: Submit Operation and Maintenance data as called for in other sections. When a copy of approval submittals is included in the O&M Manual, only the final "Approved" or "Approved as Noted" copy shall be used. Contractor shall organize these data in the O&M Manuals tabbed by specification number. Prepare O&M Manuals as required by Division 1 and as described herein. Submit manuals at the Substantial Completion inspection.

2 PRODUCTS

2.1 All materials shall be new or Owner-supplied reused as shown on the drawings, the best of their respective kinds, suitable for the conditions and duties imposed on them at the building and shall be of reputable manufacturers. The description, characteristics, and requirements of materials to be used shall be in accordance with qualifying conditions established in the following sections.

2.2 Equipment and Materials:

2.2.1 Shall be new and the most suitable grade for the purpose intended. Equipment furnished under this division shall be the product of a manufacturer regularly engaged in the manufacture of such items for a period of three years. Where practical, all of the components shall be products of a single manufacturer in order to provide proper coordination and responsibility. Where required, Contractor shall furnish proof of installation of similar units or equipment.

2.2.2 Each item of equipment shall bear a name plate showing the manufacturer's name, trade name, model number, serial number, ratings and other information necessary to fully identify it. This plate shall be permanently mounted in a prominent location and shall not be concealed, insulated or painted.

2.2.3 The label of the approving agency, such as UL, IBR, ASME, ARI, AMCA, by which a standard has been established for the particular item shall be in full view.

2.2.4 The equipment shall be essentially the standard product of a manufacturer regularly engaged in the production of such equipment and shall be a product of the manufacturer's latest design.

2.2.5 A service organization with personnel and spare parts shall be available within two hours for each type of equipment furnished.

2.2.6 Install in accordance with manufacturer's recommendations. Place in service by a factory trained representative where required.

2.2.7 Materials and equipment are specified herein by a single or by multiple manufacturers to indicate quality, material and type of construction desired. Manufacturer's products shown on the drawings have been used as basis for design; it shall be the Contractor's responsibility to ascertain that alternate manufacturer's products, or the particular products of named manufacturers, meet the detailed specifications and that size and arrangement of equipment are suitable for installation.

2.2.8 Model Numbers: Catalog numbers and model numbers indicated in the drawings and specifications are used as a guide in the selection of the equipment and are only listed for the contractor's convenience. The contractor shall determine the actual model numbers for ordering materials in accordance with the written description of each item and with the intent of the drawings and specifications.

2.3 Requests for Substitution:

2.3.1 Where a particular system, product or material is specified by name, consider it as standard basis for bidding, and base proposal on the particular system, product or material specified.

2.3.2 Requests by Contractor for substitution will be considered only when reasonable, timely, fully documented, and qualifying under one or more of the following circumstances.

2.3.2.1 Required product cannot be supplied in time for compliance with Contract time requirements.

2.3.2.2 Required product is not acceptable to governing authority, or determined to be non-compatible, or cannot be properly coordinated, warranted or insured, or has other recognized disability as certified by Contractor.

2.3.2.3 Substantial cost advantage is offered Owner after deducting offsetting disadvantages including delays, additional compensation for redesign, investigation, evaluation and other necessary services and similar considerations.

2.3.3 All requests for substitution shall contain a "Comparison Schedule" and clearly and specifically indicate any and all differences or omissions between the product specified as the basis of design and the product proposed for substitution. Differences shall include but shall not be limited to data as follows for both the specified and substituted products:

Principal of operation.
Materials of construction or finishes.
Thickness of gauge of materials.
Weight of item.
Deleted features or items.
Added features or items.
Changes in other work caused by the substitution.
Performance curves.

If the approved substitution contains differences or omissions not specifically called to the attention of the Architect/Engineer, the Owner reserves the right to require equal or similar features to be added to the substituted products (or to have the substituted products replaced) at the Contractor's expense.

3 EXECUTION

3.1 Workmanship: All materials and equipment shall be installed and completed in a first-class workmanlike manner and in accordance with the best modern methods and practice. Any materials installed which do not present an orderly and reasonably neat and/or workmanlike appearance, or do not allow adequate space for maintenance, shall be removed and replaced when so directed by the Architect/Engineer.

3.2 Coordination:

3.2.1 The Contractor shall be responsible for full coordination of the mechanical systems with shop drawings of the building construction so the proper openings and sleeves or supports are provided for piping, ductwork, or other equipment passing through slabs or walls.

3.2.2 Any additional steel supports required for the installation of any mechanical equipment, piping, or ductwork shall be furnished and installed under the section of the specifications requiring the additional supports.

3.2.3 It shall be the Contractor's responsibility to see that all equipment such as valves, dampers, filters and such other apparatus or equipment that may require maintenance and operation are made easily accessible, regardless of the diagrammatic location shown on the drawings.

3.2.4 All connections to fixtures and equipment shown on the drawings shall be considered diagrammatic unless otherwise indicated by detail. The actual connections shall be made to fully suit the requirements of each case and adequately provide for expansion and servicing.

3.2.5 The contractor shall protect equipment, material, and fixtures at all times. He shall replace all equipment, material, and fixtures which are damaged as a result of inadequate protection.

3.2.6 Prior to starting and during progress of work, examine work and materials installed by others as they apply to work in this division. Report conditions which will prevent satisfactory installation.

3.2.7 Start of work will be construed as acceptance of suitability of work of others.

3.3 Interruption of Service: Before any equipment is shut down for disconnecting or tie-ins, arrangements shall be made with the Architect/Engineer and this work shall be done at the time best suited to the Owner. This will typically be on weekends and/or holidays and/or after normal working hours. Services shall be restored the same day unless prior arrangements are made. All overtime or premium costs associated with this work shall be included in the base bid.

3.4 Phasing: Provide all required temporary valves, piping, ductwork, equipment and devices as required. Maintain temporary services to areas as required. Remove all temporary material and equipment on completion of work unless Engineer concurs that such material and equipment would be beneficial to the Owner on a permanent basis.

3.5 Cutting and Patching: Notify General Contractor to do all cutting and patching of all holes, chases, sleeves, and other openings required for installation of equipment furnished and installed under this section. Utilize experienced trades for cutting and patching. Obtain permission from Architect/Engineer before cutting any structural items.

3.6 Equipment Setting: Bolt equipment directly to concrete pads or vibration isolators as required, using hot-dipped galvanized anchor bolts, nuts and washers. Level equipment.

3.7 Painting: Touch-up factory finishes on equipment located inside and outside shall be done under Division 23. Obtain matched color coatings from the manufacturer and apply as directed. If corrosion is found during inspection on the surface of any equipment, clean, prime, and paint, as required.

3.8 Clean-up: Thoroughly clean all exposed parts of apparatus and equipment of cement, plaster, and other materials and remove all oil and grease spots. Repaint or touch up as required to look like new. During progress of work, contractor is to carefully clean up and leave premises and all portions of building free from debris and in a clean and safe condition.

3.9 Start-up and Operational Test: Start each item of equipment in strict accordance with the manufacturer's instructions; or where noted under equipment specification, start-up shall be done by a qualified representative of the manufacturer. Alignment, lubrication, safety, and operating control shall be included in start-up check.

3.10 Climate Control: Operate heating and cooling systems as required after initial startup to maintain temperature and humidity conditions to avoid freeze damage and warping or sagging of ceilings and carpet.

3.11 Record Drawings:

3.11.1 During the progress of the work the Contractor shall record on their field set of drawings the exact location, as installed, of all piping, ductwork, equipment, and other systems which are not installed exactly as shown on the contract drawings.

3.11.2 Upon completion of the work, record drawings shall be prepared as described in the General Conditions, Supplementary Conditions, and Division 1 sections.

3.12 Acceptance:

3.12.1 Punch List: Submit written confirmation that all punch lists have been checked and the required work completed.

3.12.2 Instructions: At completion of the work, provide a competent and experienced person who is thoroughly familiar with project, for one day to instruct permanent operating personnel in operation of equipment and control systems. This is in addition to any specific equipment operation and maintenance training.

3.12.3 Operation and Maintenance Manuals: Furnish four complete manuals bound in ring binders with Table of Contents, organized, and tabbed by specification section. Manuals shall contain:

Detailed operating instructions and instructions for making minor adjustments.
Complete wiring and control diagrams.
Routine maintenance operations.
Manufacturer's catalog data, service instructions, and parts lists for each piece of operating equipment.
Copies of approved submittals.
Copies of all manufacturer's warranties.
Copies of test reports and verification submittals.

3.12.4 Record Drawings: Submit record drawings.

3.12.5 Test and Balance Report: Submit four certified copies. The Report shall be submitted for review prior to the Substantial Completion Inspection unless otherwise required by Division 1.

3.12.6 Acceptance will be made on the basis of tests and inspections of job. A representative of firm that performed test and balance work shall be in attendance to assist. Contractor shall furnish necessary mechanics to operate system, make any necessary adjustments and assist with final inspection.

3.12.7 Control Diagrams: Frame under glass and mount on equipment room wall.

END OF SECTION 230100

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SECTION 230513 - ELECTRIC MOTORS

1 GENERAL

1.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications Section apply to work of this Section.

1.2 This section is a Division 23 Basic Mechanical Materials and Methods section, and is part of each Division 23 section making reference to motors specified herein.

1.3 Extent of motors required by this section is indicated on drawings and/or specified in other Division-23 sections.

1.4 Comply with the requirements of Division 26.

1.5 UL Compliance: Comply with applicable UL standards pertaining to motors.

1.6 Approval Submittals:

1.6.1 Product Data: When required by other Division-23 sections, submit manufacturers standard product data sheets for each type of motor provided. Submit with Division-23 section using the motors, not as a separate submittal. Mark data sheet with arrows indicating product being supplied and list by unique descriptive name all motors to which each data sheet applies. Clearly indicate type, service factor, rpm, duty cycle, voltage, phase, nominal full load efficiency, power factor and insulation class. Field verify and coordinate mounting and frame requirements for matching the drive.

1.7 O&M Data Submittals: Submit a copy of approval submittals. Submit operation and maintenance data for each type of motor. Include these data in O&M Manual. Submit two copies of nameplate data sheet for each motor. One copy shall be included with the O&M Manual and a second copy shall be inserted in a waterproof pouch or bag and attached to the motor. Nameplate data sheets shall be typed or neatly printed and shall include all data on the motor nameplate plus a unique motor description such as "AHU-3 Fan Motor", "Distribution Pump #1" or similar description.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, General Electric, Baldor, US Electric, or approved equal.

2.2 General:

2.2.1 Motors shall conform to applicable portions of NEMA Standard MG-1, Motors and Generators.

2.2.2 Motors shall be sized for the application such that when the driven equipment is operated at rated capacity the motor current will not exceed the full-load nameplate current. Service factor shall not be used in normal operation.

2.3 Motor Design:

2.3.1 Integral Horsepower Motors:

2.3.1.1 Motors shall be open drip-proof or totally enclosed fan cooled as shown on the drawings or listed in the Division 23 section requiring motors.

2.3.1.2 Motors shall be three phase, 60 hertz, nominal 1800 rpm, rated at 200 volts for 208 volt systems, 230 volts for 240 volt systems and 460 volts for 480 volt systems.

2.3.1.3 Motors shall be NEMA Design B and shall have 1.15 service factor or greater at 60 hertz.

2.3.1.4 Insulation Systems

2.3.1.4.1 In fixed speed applications, motors shall have Class B insulation with 80ºC rise over 40ºC ambient.

2.3.1.4.2 For variable frequency drive (VFD) applications, motors shall have Class F insulation with 105ºC rise over 40ºC ambient. Motor manufacturer shall identify motors being used for VFD applications by marking the motor with a stainless steel name-plate “Inverter Ready”.

2.3.1.5 Motor efficiencies shall be based on IEEE-112, 1984, Test Method B, as specified in NEMA Standard MG1-12.53. NEMA motor efficiency and power factor shall be clearly shown on the motor nameplate. Inverter duty motors shall have a CIV rating based on NEMA.

2.3.1.6 Motors shall be premium efficiency type and shall meet or exceed the following minimum nominal efficiencies at rated voltage.

230/460 VOLT, 3 PHASE

HORSEPOWER RANGE	MINIMUM NOMINAL EFFICIENCY	MINIMUM ACCEPTABLE POWER FACTOR
1 to 2 hp	84.0 pct.	75.0 pct
3 to 5 hp	87.5 pct.	77.0 pct
7.5 hp	89.5 pct.	80.0 pct
10 hp	90.2 pct.	80.0 pct
15 hp	91.0 pct.	82.0 pct
20 to 25 hp	92.0 pct.	82.0 pct
30 hp	92.4 pct.	82.0 pct
40 to 50 hp	93.0 pct.	85.0 pct
60 hp	93.6 pct.	85.0 pct
75 hp	94.1 pct.	85.0 pct
100 to 125 hp	94.5 pct.	85.0 pct
150 to 200 hp	95.0 pct.	85.0 pct
over 200 hp	95.4 pct.	87.0 pct

200 VOLT, 3 PHASE

HORSEPOWER RANGE	MINIMUM NOMINAL EFFICIENCY	MINIMUM ACCEPTABLE POWER FACTOR
1 to 2 hp	84.0 pct.	75.0 pct
3 to 5 hp	87.5 pct.	77.0 pct
7.5 hp	89.5 pct.	80.0 pct
10 hp	90.2 pct.	80.0 pct
15 hp	91.0 pct.	80.0 pct
20 to 25 hp	92.0 pct.	80.0 pct

2.3.1.7 Motors 25 hp and larger which are to be installed outdoors or in other high humidity areas shall be equipped with silicone rubber space heaters. Space heaters shall be energized when motor is de-energized.

2.3.2 Fractional Horsepower Motors one-half hp and above:

2.3.2.1 Motors shall be open drip-proof or totally enclosed fan cooled as shown on the drawings or listed in the Division 23 section requiring motors.

2.3.2.2 Motors shall be three phase, 60 hertz, nominal 1800 rpm, rated at 200, 230 or 460 volts as shown on the drawings.

2.3.2.3 Motors shall be NEMA Design B with class B insulation, unless used with variable frequency drives.

2.3.3 Fractional Horsepower Motors less than one-half hp:

2.3.3.1 Motors shall be single phase, 60 hertz, rated at 120 volts with integral thermal protection.

2.4 Overload Protection: Properly sized overload protection shall be provided for each motor. This protection may be an integral part of the motor or may be part of the motor controller and shall interrupt each ungrounded conductor.

3 EXECUTION

3.1 Motor Size and Location:

3.1.1 Size and location of motors shown on the drawings are based on a particular design and may change with a different manufacturer. Submittal of shop drawings or product literature indicating motor sizes or locations different from that designed indicates that Contractor has fully coordinated any required changes to the electrical system with other trades. Approval (if made) is on this basis and no additional cost will be allowed for any changes.

3.1.2 Contractor shall verify and make any necessary adjustments to electrical service, branch circuit wiring, branch circuit protection, overload protection, disconnect and controller (starter), or VFD based on actual nameplate data of the motors supplied prior to installation. Where applicable, connect motor winding thermostat to VFD.

3.2 Motor Voltages: Contractor shall field verify system voltage prior to ordering or installing any motors. Submittal of shop drawings or product literature indicating motor voltages indicates that Contractor has fully coordinated the motor with the electrical system and that any discrepancies have been resolved. Approval (if made) is on this basis and no additional cost will be allowed for any changes.

3.3 Motor Mounting: Adjust motor mounting as required to adjust the drive train for proper belt operation and to accommodate sheave changes or other requirements of the test and balance work.

END OF SECTION 230513

SECTION 230519 - METERS AND GAUGES

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-23 section making reference to or requiring meters and gauges specified herein.

1.3 Extent of meters and gauges required by this section is indicated on drawings and/or specified in other Division-23 sections.

1.4 UL Compliance: Comply with applicable UL standards pertaining to meters and gauges.

1.5 ANSI and ISA Compliance: Comply with applicable portions of ANSI and Instrument Society of America (ISA) standards pertaining to construction and installation of meters and gauges.

1.6 Approval Submittals:

1.6.1 Product Data: When required by other Division-23 sections, submit manufacturer's technical product data for each type of meter and gauge. Submit with Division-23 section using meters and gauges, not as a separate submittal. Include scale range, ratings, and calibrated performance curves, certified where indicated. Submit for:

Thermometers
Pressure gauges
Gauge connector plugs
Venturi flow meters
Automatic balancing valves

1.7 O&M Data Submittals: Submit a copy of approval submittals. Submit calibration curves and operating instructions for each type of meter or gauge. Include this data in O&M Manual.

2 PRODUCTS

2.1 Acceptable Manufacturers (Thermometers and Pressure Gauges): Subject to compliance with requirements, Ashcroft, Ernst Gauge Company, Weksler, Marshalltown Instruments, Trerice, Weiss Instruments, Wheatley, Fluidyne or approved equal.

2.2 Glass Thermometers:

2.2.1 General: Provide glass thermometers of materials, capacities, and ranges indicated, designed and constructed for use in service indicated.

2.2.2 Case: Die cast aluminum finished in baked epoxy enamel, glass front, spring secured, 9" long.

2.2.3 Adjustable Joint: Die cast aluminum, finished to match case, 180° adjustment in vertical plane, 360° adjustment in horizontal plane, with locking device.

2.2.4 Tube and Capillary: Liquid filled, magnifying lens, 1% scale range accuracy, shock mounted.

2.2.5 Scale: Satin faced, non-reflective aluminum, permanently etched markings.

2.2.6 Stem: Copper-plated steel or brass for separable socket, length to suit installation.

2.2.7 Range: Conform to the following:

2.2.7.1 Hot Water: 30° - 240°F with 2°F scale divisions.

2.2.7.2 Chilled Water: 30° - 180°F with 2°F scale divisions.

2.3 Thermometer Wells: Provide thermometer wells constructed of brass or stainless steel, pressure rated to match piping system design pressure. Provide 2" extension for insulated piping. Provide cap nut with chain fastened permanently to thermometer well if wells do not have a permanent instrument installed. Same manufacturer as thermometers.

2.4 Pressure Gauges:

2.4.1 General: Provide pressure gauges of materials, capacities, and ranges indicated, designed and constructed for use in service indicated.

2.4.2 Type: General use, 1% accuracy, ANSI B40.1 grade A, phosphor bronze bourdon type, bottom connection.

2.4.3 Case: Drawn steel or brass, glass lens, 4-½" diameter.

2.4.4 Connector: Brass with ¼" male NPT.

2.4.5 Scale: White coated aluminum with black scale.

2.4.6 Range: Select so that highest possible pressure does not exceed 75% of full scale.

2.5 Pressure Gauge Cocks:

2.5.1 General: Provide ¼" ball valves for use as pressure gauge cocks.

2.5.2 Snubber: ¼" brass bushing with corrosion resistance porous metal disc, through which pressure fluid is filtered. Select disc material for fluid served and pressure rating.

2.6 Gauge Connector Plugs:

2.6.1 Provide temperature gauge connector plugs pressure rated for 500 psi and 200ºF. Construct of brass and finish in nickel-plate, equip with 1/2" NPT fitting, with self-sealing valve core type neoprene gasketed orifice suitable for inserting 1/2" O.D. probe assembly from dial type insertion thermometer. Equip orifice with gasketed screw cap and chain. Provide extension, length equal to insulation thickness, for insulated piping. Pete's Plug or approved equal.

2.6.2 Provide pressure gauge connector plugs pressure rated for 500 psi and 200ºF. construct of brass and finish in nickel-plate, equip with 1/2" NPT fitting, with self-sealing valve core type neoprene gasketed orifice suitable for inserting 1/2" O.D. probe assembly from dial type insertion pressure gauge. Equip orifice with gasketed screw cap and chain. Provide extension, length equal to insulation thickness, for insulated piping. Pete's Plug or approved equal.

2.6.3 Provide master test kit with hard plastic case including one 2-1/2" test gauge of suitable range, one gauge adapter probe, and one stem pocket testing thermometer (0ºF-220ºF).

2.7 Venturi Stations:

2.7.1 Provide as indicated for digital controls measurement of flow, complete venturi stations with quick disconnect valves, safety shutoff valves, venturi, and metal or plastic identification tag on chain indicating size, series, and meter reading at specified flowrate. Accuracy plus or minus 2%.

2.7.2 Venturis for pipe 2" and smaller shall be threaded bronze body. Venturis for pipe 2-1/2" and larger shall be steel body with weld ends.

2.7.3 Venturis shall not require greater than 5 pipe diameters of straight pipe upstream nor 2 pipe diameters of straight pipe downstream to achieve rated accuracy.

2.7.4 Select venturis so that design flowrate reads between 20% and 80% of the full range on the linear meter.

2.7.5 Acceptable Manufacturers: Barco Venturi (Aeroquip Corporation), Gerand Engineering Company, Preso, or approved equal.

2.8 Automatic Balancing Valves:

2.8.1 General: Provide as indicated, threaded automatic balancing valves equipped with optional valve kits to measure the flow rate. Valves shall utilize a stainless steel flow mechanism that is factory-set with ±5% accuracy. The flow mechanism shall be removable with standard tools to change the flow rate setting. Provide dual hose meter kit. Provide threaded mini's for terminal unit coils and threaded high capacity for air handlers. Provide metal nameplate to indicate flow rate. Provide valves with pre-formed polyurethane insulation suitable for use on heating and cooling systems.

2.8.2 Acceptable Manufacturers: Griswold, Autoflow Products, Bell & Gossett, Flow Design Inc.

3 EXECUTION

3.1 Installation Of Temperature Gauges:

3.1.1 General: Install temperature gauges in vertical upright position, and tilt so as to be easily read by observer standing on floor.

3.1.2 Locations: Install in the following locations, and elsewhere as indicated:

3.1.2.1 At inlet and outlet of each hydronic coil in air handling units.

3.1.2.2 At inlet and outlet of each hydronic boiler and chiller.

3.1.3 Thermometer Wells: Install in piping tee where indicated, in vertical upright position. Thermometers shall have at least 75% of stem in moving fluid.

3.1.4 Temperature Gauge Connector Plugs: Install in piping tee where indicated, located on pipe at most readable position. Secure cap.

3.2 Installation of Pressure Gauges:

3.2.1 General: Install pressure gauges in piping tee with pressure gauge cock, located on pipe at most readable position.

3.2.2 Locations: Install in the following locations, and elsewhere as indicated:

3.2.2.1 At suction and discharge of each pump.

3.2.2.2 At discharge of each water pressure reducing valve.

3.2.2.3 At inlet and outlet of water cooled condensers and refrigerant cooled chillers.

3.2.3 Pressure Gauge Cocks: Install in piping tee with snubber.

3.2.4 Pressure Gauge Connector Plugs: Install in piping tee where indicated, located on pipe at most readable position. Secure cap.

3.3 Installation of Flow Measuring Meters:

3.3.1 General: Install flow measuring meters on piping systems located in accessible locations at most readable position.

3.3.2 Locations: Install in the following locations, and elsewhere as indicated:

3.3.3 Venturi Stations: Install on piping with readout valves in vertical upright position. Maintain recommended straight lengths of unobstructed pipe both upstream and downstream. Install in accordance with manufacturer's printed instructions.

3.4 Automatic Balancing Valves: Install on piping in accordance with the manufacturer’s printed instructions. Verify proper operation over full range of control valve and pump operation.

3.5 Adjusting and Cleaning:

3.5.1 Adjusting: Adjust faces of meters and gauges to proper angle for best visibility.

3.5.2 Cleaning: Clean windows of meters and gauges and factory-finished surfaces. Replace cracked or broken windows; repair any scratched or marred surfaces with manufacturer's touch-up paint.

END OF SECTION 230519

SECTION 230520 - PIPES AND PIPE FITTINGS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-23 section making reference to pipes and pipe fittings specified herein.

1.3 Extent of pipes and pipe fittings required by this section is indicated on drawings and/or specified in other Division-23 sections.

1.4 Codes and Standards:

1.4.1 Welding: Qualify welding procedures, welders and operators in accordance with ASME B31.1, or ASME B31.9, as applicable, for shop and project site welding of piping work.

1.4.2 Brazing: Certify brazing procedures, brazers, and operators in accordance with ASME Boiler and Pressure Vessel Code, Section IX, for shop and job-site brazing of piping work.

1.5 Test Report and Verification Submittals:

Submit welding certification for all welding installers.
Submit brazing certification for all brazing installers.

2 PRODUCTS

2.1 Piping Materials: Provide pipe and tube of type, joint type, grade, size and weight (wall thickness or Class) indicated for each service. Where type, grade or class is not indicated, provide proper selection as determined by Installer for installation requirements, and comply with governing regulations and industry standards.

2.2 Pipe/Tube Fittings: Provide factory-fabricated fittings of type, materials, grade, class and pressure rating indicated for each service and pipe size. Provide sizes and types matching pipe, tube, valve or equipment connection in each case. Where not otherwise indicated, comply with governing regulations and industry standards for selections, and with pipe manufacturer's recommendations where applicable.

2.3 Piping Materials/Products:

2.3.1 Soldering Materials:

2.3.1.1 Tin-Antimony (95-5) Solder: ASTM B-32, Grade 95TA.

2.3.1.2 Silver-Phosphorus Solder: ASTM B-32, Grade 96TS.

2.3.2 Pipe Thread Tape: Teflon tape.

2.3.3 Protective Coating: Koppers Bitumastic No. 505 or equal.

2.3.4 Gaskets for Flanged Joints: ANSI B16.21; full-faced for cast iron flanges; raised-face for steel flanges, unless otherwise noted.

2.3.5 Welding Materials: Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials. Materials shall be determined by installer to comply with installation requirements.

2.3.6 Brazing Materials: Silver content of not less than 15%. Materials shall be determined by installer to comply with installation requirements.

2.4 Copper Tube and Fittings:

2.4.1 Copper Tube:

2.4.1.1 Copper Tube: ASTM B88; Type K or L as indicated for each service; hard-drawn temper unless specifically noted as annealed.

2.4.1.2 ACR Copper Tube: ASTM B280.

2.4.2 Fittings:

2.4.2.1 Wrought-Copper Solder-Joint Fittings: ANSI B16.22.

2.4.2.2 Copper Tube Unions: Provide standard products recommended by manufacturer for use in service indicated.

2.4.2.3 Cast-Copper Flared Tube Fittings: ANSI B16.26.

2.5 Steel Pipes and Pipe Fittings

2.5.1 Pipes:

2.5.1.1 Black Steel Pipe: ASTM A-53 or A-120, seamless.

2.5.1.2 Galvanized Steel Pipe: ASTM A-53 or A-120, seamless.

2.5.2 Pipe Fittings:

2.5.2.1 Threaded Cast Iron: ANSI B16.4.

2.5.2.2 Threaded Malleable Iron: ANSI B16.3; plain or galvanized as indicated.

2.5.2.3 Malleable Iron Threaded Unions: ANSI B16.39; selected by installer for proper piping fabrication and service requirements including style, end connections, and metal-to-metal seats (iron, bronze or brass); plain or galvanized as indicated.

2.5.2.4 Threaded Pipe Plugs: ANSI B16.14.

2.5.2.5 Flanged Cast Iron: ANSI B16.1, including bolting.

2.5.2.6 Steel Flanges/Fittings: ANSI B16.5, including bolting and gasketing.

2.5.2.7 Wrought-Steel Buttwelding Fittings: ANSI B16.9, except ANSI B16.28 for short radius elbows and returns, rated to match connected pipe.

2.5.2.8 Pipe Nipples: Fabricated from same pipe as used for connected pipe; except do not use less than schedule 80 pipe where length remaining unthreaded is less than 1 ½ inches, and where pipe size is less than 1 ½ inches, and do not thread nipples full length (no close-nipples).

2.6 Plastic Pipes and Fittings:

2.6.1 Pipes:

2.6.1.1 PVC DWV Pipe: ASTM D-2665, Schedule 40.

2.6.2 Fittings:

2.6.2.1 PVC Solvent Cement: ASTM D-2564.

2.6.2.2 PVC DWV Socket: ASTM D-2665.

3 EXECUTION

3.1 Installation

3.1.1 General: Install pipes and pipe fittings in accordance with recognized industry practices which will achieve permanently-leak proof piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings, but with adequate and accessible unions for disassembly and maintenance or replacement of valves and equipment. Reduce sizes (where indicated) by use of reducing fittings, not bushings. Align piping accurately at connections, within 1/16" misalignment tolerance.

3.1.2 Comply with ANSI B31 Code for Pressure Piping.

3.1.3 Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations or, if not otherwise indicated, run piping in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold piping close to walls, overhead construction, columns and other structural and permanent-enclosure elements of building; limit clearance to ½" where furring is shown for enclosure or concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 1" clearance outside insulation.

3.1.4 Concealed Piping: Unless specifically noted as “Exposed” on the drawings, conceal piping from view in finished and occupied spaces, by locating in column enclosures, chases, in hollow wall construction or above suspended ceilings; do not encase horizontal runs in solid partitions, except as indicated.

3.1.5 Electrical Equipment Spaces: Do not run piping through transformer vaults and other electrical, communications, or data equipment spaces and enclosures unless shown. Install drip pan under piping that must run through electrical spaces.

3.1.5.1 Cut pipe from measurements taken at the site, not from drawings. Keep pipes free of contact with building construction and installed work.

3.2 Piping System Joints: Provide joints of the type indicated in each piping system.

3.2.1 Solder copper tube-and-fitting joints where indicated, in accordance with recognized industry practice. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of fittings. Apply non-acid type solder flux to joint areas of both tubes and fittings. Insert tube full depth into fitting, and solder in manner which will draw solder full depth and circumference of joint. Wipe excess solder from joint before it hardens.

3.2.2 Thread pipe in accordance with ANSI B2.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound, or pipe joint tape (Teflon) where recommended by pipe/fitting manufacturer, on male threads at each joint and tighten joint to leave not more than 3 threads exposed. Paint exposed threads to retard rusting.

3.2.3 Flanged Joints: Match flanges within piping system, and at connection with valves and equipment. Clean flange faces and install gaskets. Tighten bolts to provide uniform compression of gaskets. Bolts shall project 1/8" to 3/8" beyond nut face when tight.

3.2.4 Weld pipe joints in accordance with recognized industry practice and as follows. Be guided by ANSI B.31.

3.2.4.1 Weld pipe joints only when ambient temperature is above 0°F.

3.2.4.2 Bevel pipe ends at a 37.5° angle where possible, smooth rough cuts, and clean to remove slag, metal particles and dirt.

3.2.4.3 Use pipe clamps or tack-weld joints; 4 welds for pipe sizes to 10". All welds shall be open-butt.

3.2.4.4 Build up welds with root pass, followed by filler pass and then a cover pass. Eliminate valleys at center and edges of each weld. Weld by procedures which will ensure elimination of unsound or unfused metal, cracks, oxidation, blow-holes and non-metallic inclusions.

3.2.4.5 Do not weld-out piping system imperfections by tack-welding procedures; refabricate to comply with requirements.

3.2.4.6 At Installer's option, install forged branch-connection fittings wherever branch pipe is less than 3" and at least two pipe sizes smaller than main pipe indicated; or install regular "T" fitting. Weld-O-Let or equal.

3.2.5 Plastic Pipe Joints: Comply with manufacturer's instructions and recommendations, and with applicable industry standards.

3.2.5.1 Solvent-cemented joints shall be made in accordance with ASTM D-2235 and ASTM F-402.

3.2.5.2 PVC sewer pipe bell/gasket joints shall be installed in accordance with ASTM D-2321.

3.2.6 Braze copper tube-and-fitting joints where indicated, in accordance with ANSI B.31.

3.3 Piping Installation

3.3.1 Install piping to allow for expansion and contraction.

3.3.2 Isolate all copper tubing from steel and concrete by wrapping the pipe at the contact point, and for one inch on each side, with a continuous plastic sleeve. Isolate all copper tubing installed in block walls with a continuous plastic sleeve.

3.3.3 Underground Piping:

3.3.3.1 Provide plastic tape markers over all underground piping. Provide copper wire over all underground plastic piping outside the building. Locate markers 18" above piping.

3.3.3.2 Coat the following underground (uninsulated) pipes with a heavy coat of bitumastic or provide an 8 mil polyvinyl sleeve: black steel pipe, galvanized steel pipe, copper tubing.

END OF SECTION 230520

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SECTION 230521 - PIPING SPECIALTIES

1 GENERAL

1.1 Drawings and general provisions of contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-23 section making reference to or requiring piping specialties specified herein.

2 PRODUCTS

2.1 General: Provide factory-fabricated piping specialties recommended by manufacturer for use in service indicated. Provide piping specialties of types and pressure ratings indicated for each service, or if not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes as indicated, and connections, which properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Installer's option.

2.2 Escutcheons:

2.2.1 General: Provide pipe escutcheons as specified herein with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings; and pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish for occupied areas, prime paint finish for unoccupied areas.

2.2.2 Pipe Escutcheons for Moist Areas: For waterproof floors, and areas where water and condensation can be expected to accumulate, provide cast brass or sheet brass escutcheons, solid or split hinged.

2.2.3 Pipe Escutcheons for Dry Areas: Provide sheet steel escutcheons, solid or split hinged.

2.3 Dielectric Unions: Provide standard products recommended by manufacturer Victaulic Style 47 dielectric waterways for use in service indicated, which effectively isolate ferrous from non-ferrous piping (electrical conductance), prevent galvanic action and stop corrosion. .

2.4 Fire Barrier Penetration Seals:

2.4.1 Provide seals for any opening through fire-rated walls, floors, or ceilings used as passage for mechanical components such as piping or ductwork in accordance with the requirements of Division 7.

2.5 Fabricated Piping Specialties:

2.5.1 Drip Pans: Provide drip pans fabricated from corrosion-resistant sheet metal with watertight joints, and with edges turned up 2-1/2". Reinforce top, either by structural angles or by rolling top over ¼" steel rod. Provide hole, gasket, and flange at low point for watertight joint and 1" drain line connection.

2.5.2 Pipe Sleeves: Provide pipe sleeves of one of the following:

2.5.2.1 Sheet-Metal: Fabricate from galvanized sheet metal; round tube closed with snaplock joint, welded spiral seams, or welded longitudinal joint. Fabricate from the following gages: 3" and smaller, 20 gage; 4" to 6" 16 gage; over 6", 14 gage.

2.5.2.2 Steel-Pipe: Fabricate from Schedule 40 galvanized steel pipe; remove burrs.

2.5.2.3 Iron-Pipe: Fabricate from cast-iron or ductile-iron pipe; remove burrs.

2.5.3 Sleeve Seals: Provide sleeve seals for sleeves located in foundation walls below grade, or in exterior walls, of one of the following:

2.5.3.1 Caulking and Sealant: Provide foam or caulking and sealant compatible with piping materials used.

2.6 Low Pressure Y-Type Pipeline Strainers:

2.6.1 General: Provide strainers full line size of connecting piping, with ends matching piping system materials. Provide Type 304 stainless steel screens.

2.6.1.1 Water Strainers: Select for 200 psi working pressure (water, oil or gas). Provide 20 mesh screens through 2" size and 1/16" perforations for 2½" size and larger.

2.6.2 Select from the following types:

2.6.2.1 Threaded Ends, 2" and Smaller: Cast-iron body, screwed screen retainer with centered blowdown fitted with pipe plug.

2.6.2.2 Threaded Ends, 2-1/2" and Larger: Cast-iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.

2.6.2.3 Flanged Ends, 2-1/2" and Larger: Cast-iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.

3 EXECUTION

3.1 Pipe Escutcheons: Install pipe escutcheons on each pipe penetration through floors, walls, partitions, and ceilings where penetration is exposed to view; and on exterior of building. Secure escutcheon to pipe or insulation so escutcheon covers penetration hole, and is flush with adjoining surface.

3.2 Dielectric Unions: Install at each piping joint between ferrous and non-ferrous piping. Comply with manufacturer's installation instructions.

3.3 Fire Barrier Penetration Seals: Provide pipe sleeve as required. Fill entire opening with sealing compound. Adhere to manufacturer's installation instructions. Refer to Division 7.

3.4 Drip Pans: Locate drip pans under piping passing over or within 3' horizontally of electrical equipment, and elsewhere as indicated. Hang from structure with rods and building attachments, weld rods to sides of drip pan. Brace to prevent sagging or swaying. Connect 1" drain line to drain connection, and run to nearest plumbing drain or elsewhere as indicated.

3.5 Pipe Sleeves: Install pipe sleeves of types indicated where piping passes through walls, floors, ceilings, and roofs. Do not install sleeves through structural members of work, except as detailed on drawings, or as reviewed by Architect/Engineer. Install sleeves accurately

centered on pipe runs. Size sleeves so that piping and insulation (if any) will have free movement in sleeve, including allowance for thermal expansion; but not less than 2 pipe sizes larger than piping run. Where insulation includes vapor-barrier jacket, provide sleeve with sufficient clearance for installation. Install length of sleeve equal to thickness of construction penetrated, and finish flush to surface; except floor sleeves. Extend floor sleeves ¼" above level floor finish, and ¾" above floor finish sloped to drain. Provide temporary support of sleeves during placement of concrete and other work around sleeves, and provide temporary closure to prevent concrete and other materials from entering sleeves.

3.5.1 Install sleeves in fire-rated assemblies in accordance with the listing of the assembly and the fire barrier sealant.

3.5.2 Install sheet-metal sleeves at interior partitions and ceilings other than suspended ceilings. Fill annular space with caulking or fire barrier sealant as required.

3.5.3 Install steel-pipe sleeves at floor penetrations. Fill annular space with caulking or fire barrier sealant as required.

3.5.4 Install iron-pipe sleeves at all foundation wall penetrations and at exterior penetrations; both above and below grade. Fill annular space with caulking or mechanical sleeve seals.

3.6 Y-Type Strainers: Install Y-type strainers full size of pipeline, in accordance with manufacturer's installation instructions. Install pipe nipple and shutoff valve in strainer blow down connection, full size of connection, except for strainers ¾" and smaller installed ahead of control valves feeding individual terminals. Where indicated, provide drain line from shutoff valve to plumbing drain, full size of blow down connection.

3.7 Locate Y-type strainers in supply line ahead of the following equipment, and elsewhere as indicated, if integral strainer is not included in equipment:

Pumps
Temperature control valves.
Pressure reducing valves.
Temperature or pressure regulating valves.

END OF SECTION 230521

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SECTION 230523 - VALVES

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to the work of this section.

1.2 This section is a Division-23 Basic Materials and Methods section, and is part of each Division-23 section making reference to or requiring valves specified herein.

1.3 Extent of valves required by this section is indicated on drawings and/or specified in other Division-23 sections.

1.4 Quality Assurance:

1.4.1 Valve Dimensions: For face-to-face and end-to-end dimensions of flanged or welding-end valve bodies, comply with ANSI B16.10.

1.4.2 Valve Types: Provide valves of same type by same manufacturer.

1.4.3 Valve Listing: For valves on fire protection piping, provide UL listing.

1.4.4 Valves Installed in Boiler Rooms: Comply with ASME Boiler and Pressure Vessel Code.

1.5 Approval Submittals: Submit product data, catalog cuts, specifications, and dimensioned drawings for each type of valve. Include pressure drop curve or chart for each type and size of valve. Submit valves with Division-23 section using the valves, not as a separate submittal. For each valve, identify systems where the valve is intended for use.

Gate Valves. Type GA.
Check Valves. Type CK.
Ball Valves. Type BA.
Butterfly Valves. Type BF.

1.6 O&M Data Submittals: Submit a copy of approval submittals. Submit installation instructions, maintenance data and spare parts lists for each type of valve. Include this data in the O&M Manual.

2 PRODUCTS

2.1 General: Provide factory-fabricated valves recommended by manufacturer for use in service indicated. Provide valves of types and pressure ratings indicated; provide proper selection as determined by Installer to comply with specifications and installation requirements. Provide sizes as indicated, and connections which properly mate with pipe, tube, and equipment connections.

2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide valves of one of the producers listed for each valve type. The model numbers are listed for contractor's convenience only. In the case of a model number discrepancy, the written description shall govern.

2.3 Gate Valves:

2.3.1 Packing: Select valves designed for repacking under pressure when fully opened, equipped with

2.3.2 non-asbestos packing suitable for intended service. Select valves designed so back seating protects packing and stem threads from fluid when valve is fully opened, and equipped with gland follower.

2.3.3 Comply with the following standards:

Cast Iron Valves: MSS SP-70. Cast Iron Gate Valves, Flanged and Threaded Ends.
Bronze Valves: MSS SP-80. Bronze Gate, Globe, Angle and Check Valves.
Steel Valves: ANSI B16.34. Steel Standard Class Valve Ratings.

2.3.4 Types of gate (GA) valves:

1 Threaded Ends 2" and Smaller (GA1): Class 125, bronze body, screwed bonnet, rising stem, solid wedge. Stockham B-100. Nibco T-111. Crane 428. Milwaukee 148.

2 Soldered Ends 2" and Smaller (GA2): Class 125, bronze body, screwed bonnet, non-rising stem, solid wedge. Stockham B-108 or B-109. Nibco S-111. Crane 1334. Milwaukee 149.

3 Flanged Ends 2½" and Larger (GA3): Class 125, iron body, bronze mounted, bolted bonnet, rising stem, OS&Y, solid wedge. Stockham G-623. Nibco F617-0. Crane 465½. Milwaukee F2885.

4 Threaded Ends 2" and Smaller (GA4): Class 150, bronze body, screwed bonnet, rising stem, solid wedge. Stockham B-122. Nibco T-131. Crane 431. Milwaukee 1150.

5 Soldered Ends 2" and Smaller (GA5): Class 150, bronze body, screwed bonnet, rising stem, solid wedge. Stockham B-124. Nibco S-134. Milwaukee 1169.

6 Threaded Ends 2" and Smaller (GA6): 175 WWP, bronze body, screwed bonnet, rising stem, OS&Y, solid wedge, UL-listed. Stockham B-133. Nibco T-104-0.

7 Flanged Ends 2½" and Larger (GA7): 175 WWP, iron body, bolted bonnet, rising stem, OS&Y, solid wedge, UL listed. Stockham G-634. Nibco F-607-0TS

8 Threaded Ends 2" and Smaller (GA8): Class 200, bronze body, union bonnet, rising stem, solid wedge, renewable seat. Stockham B-132. Nibco T-154-SS. Milwaukee 1174.

9 Flanged Ends 2½" and Larger (GA9): Class 250, iron body bronze mounted, bolted bonnet, rising stem, OS&Y, solid wedge. Stockham F-667. Nibco F-667-0. Crane 7½E. Milwaukee F-2894.

10 Threaded Ends 2" and Smaller (GA10): Class 300, bronze body, union bonnet, rising stem, solid wedge, renewable seat. Stockham B-145. Nibco T-174-SS. Crane 634E. Milwaukee 1184.

11 Flanged Ends 2½" and Larger (GA11): Class 300, cast steel body, bolted bonnet, rising stem, solid wedge, seal-welded seat rings. Provide trim to match use. Stockham 30-0F. Crane 33.

12 Flanged Ends 2½" and Larger (GA12): 300 WWP, iron body, bolted bonnet, bronze mounted, rising stem, OS&Y, solid wedge, UL-listed. Stockham F-670. Nibco F-697-0.

2.4 Check Valves:

2.4.1 Construction: Construct valves of castings free of any impregnating materials. Construct valves with a bronze regrinding disc with a seating angle of 40º to 45º, unless a composition disc is specified. Provide stop plug as renewable stop for disc hanger, unless otherwise specified. Disc and hanger shall be separate parts with disc free to rotate. Support hanger pins on both ends by removable side plugs.

2.4.2 Comply with the following standards:

Cast Iron Valves: MSS SP-71. Cast Iron Swing Check Valves, Flanged and Threaded Ends.
Bronze Valves: MSS SP-80. Bronze Gate, Globe, Angle and Check Valves.
Steel Valves: ANSI B16.34. Steel Standard Class Valve Ratings.

2.4.3 Types of check (CK) valves:

1 Threaded Ends 2" and Smaller (CK1): Class 125, bronze body, screwed cap, horizontal swing, bronze disc. Stockham B-319. Nibco T-413-BY. Crane 1707. Milwaukee 509.

2 Soldered Ends 2" and Smaller (CK2): Class 125, bronze body, screwed cap, horizontal swing, bronze disc. Stockham B-309. Nibco S-413-B. Crane 1707S. Milwaukee 1509.

3 Flanged Ends 2½" and Larger (CK3): Class 125, iron body, bronze-mounted, bolted cap, horizontal swing, cast-iron or composition disc. Stockham G-931 or G-932 as applicable. Nibco F918-B. Crane 373. Milwaukee F2974 as applicable.

4 Threaded Ends 2" and Smaller (CK4): 200 WWP, bronze body, screwed cap, horizontal swing, regrinding type bronze disc, for fire sprinkler use. Nibco KT-403-W.

5 Flanged Ends 2½" and Larger (CK5): 175 WWP, iron body, bolted cap, bronze mounted, composition disc, UL listed, with ball drip if required. Stockham G-940. Nibco F-908-W.

6 Threaded Ends 2" and Smaller (CK6): Class 200, bronze body, screwed cap, Y-pattern swing, regrinding bronze disc. Stockham B-345. Nibco T-453-B. Crane 36. Milwaukee 518/508.

7 Flanged Ends 2½" and Larger (CK7): Class 250, iron body, bronze mounted, bolted cap, cast-iron disc. Stockham F-947. Nibco F-968-B. Crane 39E. Milwaukee F2970.

8 Threaded Ends 2" and Smaller (CK8): Class 300, bronze body, screwed cap, Y-pattern swing, regrinding bronze disc. Stockham B-375. Nibco T-473-B. Crane 76E. Milwaukee 517/507.

9 Flanged Ends 2½" and Larger (CK9): Class 300, cast steel body, bolted cap, horizontal swing, seal welded seat rings, chromium stainless disc. Stockham 30-SF. Crane 159.

2.5 Ball Valves:

2.5.1 General: Select with port area equal to or greater than connecting pipe area, include seat ring designed to hold sealing material.

2.5.2 Construction: Ball valves shall be rated for 150 psi saturated steam and 600 psi non-shock cold water. Pressure containing parts shall be constructed of ASTM B-584 alloy 844, or ASTM B-124 alloy 377. Valves shall be furnished with blow-out proof bottom loaded stem constructed of

ASTM B-371 alloy 694 or other approved low zinc material. Provide TFE packing, TFE thrust washer, chrome-plated ball and reinforced teflon seats. Valves 1" and smaller shall be full port design. Valves 1¼" and larger shall be conventional port design. Stem extensions shall be furnished for use in insulated piping where insulation exceeds ½" thickness.

2.5.3 Comply with the following standards:

MSS SP-72. Ball Valves with Flanged or Butt Welding Ends for General Service.
MSS SP-110. Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

2.5.4 Types of ball (BA) valves:

1 Threaded Ends 2" and Smaller (BA1): Bronze two-piece full port body with adjustable stem packing, stainless steel ball, trim, and handle. Nibco T-585-66. Stockham T285-BR-R-T. Milwaukee BA100S. Apollo 77-100.

2 Soldered Ends 2" and Smaller (BA2): Bronze three-piece full port body with adjustable stem packing. Nibco S-595-Y-66. Milwaukee BA350. Apollo 82-200.

3 Threaded Ends 1" and Smaller (BA3): Bronze two-piece full port body, UL listed (UL 842) for use with flammable liquids and LP gas. Nibco T-585-70-UL.

4 Threaded Ends 2" and Smaller (BA4): 175 WWP, bronze two-piece body, UL listed for fire protection service. Nibco KT-585-70-UL and KT-580-70-UL.

5 Threaded Ends 2" and Smaller (BA5): 400 WWP, bronze two-piece body, for fire protection service. Nibco KT-580.

6 Threaded Ends 2½" and Smaller (BA6): 300 WWP, bronze three-piece body, gear operator with handwheel, indicator flag, accepts tamper switch, for fire protection, UL listed. Nibco T-505-4 and G-505-4.

7 Flanged Ends 2½" and Larger (BA7): Class 150, carbon steel full bore two-piece body with adjustable stem packing, stainless steel ball, trim, and handle. Nibco F515-S6 series. Apollo 88A-240.

2.6 Butterfly Valves:

2.6.1 General: Comply with MSS SP-67, Butterfly Valves. Provide butterfly valves designed for tight shut-off. Where used for terminal or equipment removal or repair, select lug type valves. Select wafer type valves for other applications. Provide gear operators on all butterfly valves 6" and larger.

2.6.2 Types of butterfly (BF) valves:

1 Wafer Type 3" and Larger (BF1): 200 CWP, cast-iron body, lever-operated, cadmium-plated ductile iron disc, Type 410 stainless steel stem, EPT seat. Stockham LG-512. Nibco WD 2110-3. Crane 42-FXB-TL. Milwaukee MW222E-8416.

2 Lug Type 3" and Larger (BF2): 200 CWP, cast-iron body, lever-operated, cadmium-plated ductile iron disc, Type 410 stainless steel stem, EPT seat. Stockham LG-712. Nibco LD 2110-3. Crane 44-FXB-TL. Milwaukee ML132B-8416.

3 Wafer Type 3" and Larger (BF3): 150/200 CWP, cast-iron body, gear-operated,

cadmium-plated ductile iron disc, Type 410 stainless steel stem, EPT seat. Stockham LG-522 and LG-521. Nibco WD 2110-5. Crane 42-FXB-G. Milwaukee MW 122B-8115.

4 Lug Type 3" and Larger (BF4): 150/200 CWP, cast-iron body, gear-operated, cadmium-plated ductile iron disc, Type 410 stainless steel stem, EPT seat. Stockham LG-722 and LG-721. Nibco LD 2110-5. Crane 44-FXB-G. Milwaukee ML 132B-8115.

5 Wafer Type 4" and Larger (BF5): 175 WWP, cast-iron body, gear-operated, nickel-plated ductile iron disc, Type 410 stainless steel stem, EPT seat, UL listed. Stockham LG-52U. Nibco WD 3510-8.

6 Lug Type 4" and Larger (BF6): 175 WWP, cast-iron body, gear-operated, nickel-plated ductile iron or aluminum bronze disc, Type 410 stainless steel stem, EPT seat, UL listed. Stockham LG-72U. Nibco LD 3510-8.

7 Grooved Type 4" and Larger (BF7): 175 WWP, cast-iron body, gear-operated, nickel-plated ductile iron or aluminum bronze disc, Type 410 stainless steel stem, EPT seat, UL listed. Stockham LG-82U. Nibco GD 1765-2.

2.7 Valve Features:

2.7.1 General: Provide valves with features indicated and, where not otherwise indicated, provide proper valve features as determined by Installer for installation requirements. Comply with ANSI B31.1

2.7.2 Valve features specified or required shall comply with the following:

1 Bypass: Comply with MSS SP-45, and except as otherwise indicated, provide manufacturer's standard bypass piping and valving. Provide for gate valves 8" and larger.

2 Drain: Comply with MSS SP-45, and provide threaded pipe plugs complying with applicable Division-22 pipe or tube section. Provide for gate valves 8" and larger.

3 Flanged: Provide valve flanges complying with ANSI B16.1 (cast iron), ANSI B16.5 (steel), or ANSI B16.24 (bronze).

4 Threaded: Provide valve ends complying with ANSI B2.1.

5 Solder-Joint: Provide valve ends complying with ANSI B16.18.

6 Trim: Fabricate pressure-containing components of valve, including stems (shafts) and seats from brass or bronze materials, of standard alloy recognized in valve manufacturing industry unless otherwise specified.

7 Non-Metallic Disc: Provide non-metallic material selected for service indicated in accordance with manufacturer's published literature.

8 Renewable Seat: Design seat of valve with removable disc, and assemble valve so disc can be replaced when worn.

9 Extended Stem: Increase stem length by 2" minimum, to accommodate insulation applied over valve.

10 Mechanical Actuator: Provide factory-fabricated gears, gear enclosure, external chain attachment and chain designed to provide mechanical advantage in operating valve for all valves 4" and larger that are mounted more than 7'-0" above the floor, or are otherwise difficult to operate regardless of height.

3 EXECUTION

3.1 Installation:

3.1.1 General: Install valves where required for proper operation of piping and equipment, including valves in branch lines to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward below horizontal plane.

3.1.2 Insulation: Where insulation is indicated, install extended-stem valves, arranged in proper manner to receive insulation.

3.1.3 Applications Subject to Corrosion: Do not install bronze valves and valve components in direct contact with steel, unless bronze and steel are separated by dielectric insulator.

3.1.4 Mechanical Actuators: Install mechanical actuators as recommended by valve manufacturer.

3.2 Selection of Valve Ends (Pipe Connections): Except as otherwise indicated, select and install valves with the following ends or types of pipe/tube connections:

3.2.1 Tube Size 2" and Smaller: Threaded valves.

3.2.2 Pipe Size 2" and Smaller: Threaded valves.

3.2.3 Pipe Size 2½" and Larger: Flanged valves.

3.3 Non-Metallic Disc: Limit selection and installation of valves with non-metallic disc to locations indicated and where foreign material in piping system can be expected to prevent tight shutoff of metal seated valves.

3.4 Renewable Seats: Select and install valves with renewable seats, except where otherwise indicated.

3.5 Installation of Check Valves: Install in horizontal position with hinge pin horizontally perpendicular to center line of pipe. Install for proper direction flow.

END OF SECTION 230523

SECTION 230529 - SUPPORTS, ANCHORS, AND SEALS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-23 Basic Materials and Methods section, and is a part of each Division-23 section making reference to or requiring supports, anchors, and seals specified herein.

1.3 Extent of supports, anchors, and seals required by this section is indicated on drawings and/or specified in other Division-23 sections.

1.4 Code Compliance: Comply with applicable codes pertaining to product materials and installation of supports, anchors, and seals.

1.5 MSS Standard Compliance:

1.5.1 Provide pipe hangers and supports of which materials, design, and manufacture comply with ANSI/MSS SP-58.

1.5.2 Select and apply pipe hangers and supports, complying with MSS SP-69.

1.5.3 Fabricate and install pipe hangers and supports, complying with MSS SP-89.

1.5.4 Terminology used in this section is defined in MSS SP-90.

1.6 UL Compliance: Provide products which are Underwriters Laboratories listed .

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide supports and hangers by Grinnel, Michigan Hanger Company, B-Line Systems, or approved equal.

2.2 Horizontal-Piping Hangers and Supports: Except as otherwise indicated, provide factory-fabricated horizontal-piping hangers and supports complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper-piping systems.

2.2.1 Adjustable Steel Clevises: MSS Type 1.

2.2.2 Steel Double Bolt Pipe Clamps: MSS Type 3.

2.2.3 Adjustable Steel Band Hangers: MSS Type 7.

2.2.4 Steel Pipe Clamps: MSS Type 4.

2.2.5 Pipe Stanchion Saddles: MSS Type 37, including steel pipe base support and cast-iron floor flange.

2.2.6 Single Pipe Rolls: MSS Type 41.

2.2.7 Adjustable Roller Hanger: MSS Type 43.

2.2.8 Pipe Roll Stands: MSS Type 44 or Type 47.

2.3 Vertical-Piping Clamps: Except as otherwise indicated, provide factory-fabricated vertical-piping clamps complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.

2.3.1 Two-Bolt Riser Clamps: MSS Type 8.

2.3.2 Four-Bolt Riser Clamps: MSS Type 42.

2.4 Hanger-Rod Attachments: Except as otherwise indicated, provide factory-fabricated hanger-rod attachments complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping hangers and building attachments, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hanger-rod attachments to suit hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.

2.4.1 Steel Turnbuckles: MSS Type 13.

2.4.2 Malleable Iron Sockets: MSS Type 16.

2.5 Building Attachments: Except as otherwise indicated, provide factory-fabricated building attachments complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods.

2.5.1 Center Beam Clamps: MSS Type 21.

2.5.2 C-Clamps: MSS Type 23.

2.5.3 Malleable Beam Clamps: MSS Type 30.

2.5.4 Side Beam Brackets: MSS Type 34.

2.5.5 Concrete Inserts: MSS Type 18.

2.6 Saddles and Shields: Except as otherwise indicated, provide saddles or shields under piping hangers and supports, factory-fabricated, for all insulated piping. Size saddles and shields for exact fit to mate with pipe insulation.

2.6.1 Protection Shields: MSS Type 40; of length recommended by manufacturer to prevent crushing of insulation.

2.6.2 Protection Saddles: MSS Type 39; use with rollers, fill interior voids with segments of insulation matching adjoining insulation.

2.7 Miscellaneous Materials:

2.7.1 Metal Framing: Provide products complying with NEMA STD ML 1.

2.7.2 Steel Plates, Shapes and Bars: Provide products complying with ANSI/ASTM A 36.

2.7.3 Cement Grout: Portland cement (ANSI/ASTM C 150, Type I or Type III) and clean uniformly graded, natural sand (ANSI/ASTM C 404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum amount of water required for placement and hydration.

2.7.4 Heavy-Duty Steel Trapezes: Fabricate from steel shapes or continuous channel struts selected for loads required; weld steel in accordance with AWS standards.

3 EXECUTION

3.1 Preparation

3.1.1 Proceed with installation of hangers, supports and anchors only after required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not limited to) proper placement of inserts, anchors and other building structural attachments.

3.1.2 Prior to installation of hangers, supports, anchors and associated work, Installer shall meet at project site with Contractor, installer of each component of associated work, and installers of other work requiring coordination with work of this section for purpose of reviewing material selections and procedures to be followed in performing the work in compliance with requirements specified.

3.2 Installation of Building Attachments:

3.2.1 Install building attachments at required locations within concrete or on structural steel for proper piping support. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional building attachments where support is required for additional concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert securely to forms. Where concrete with compressive strength less than 2500 psi is indicated, install reinforcing bars through openings at top of inserts.

3.2.2 In areas of work requiring attachments to existing concrete, use self drilling rod inserts, Phillips Drill Co., "Red-Head" or equal.

3.3 Installation of Hangers and Supports:

3.3.1 General: Install hangers, supports, clamps and attachments to support piping properly from building structure; comply with MSS SP-69. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Install supports with maximum spacings complying with MSS SP-69 or as listed herein, whichever is most limiting. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.

3.3.1.1 Horizontal steel pipe and copper tube 1-1/4" diameter and smaller: support on 6 foot centers.

3.3.1.2 Horizontal steel pipe and copper tube 1-1/2" diameter and larger: support on 10 foot centers.

3.3.1.3 Vertical steel pipe and copper tube: support at each floor.

3.3.1.4 Plastic pipe: support in accordance with manufacturer's recommendations and the Florida Building Code, Plumbing.

3.3.1.5 Fire protection piping: support in accordance with NFPA 13.

3.3.2 Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories.

3.3.3 Paint all black steel hangers with black enamel. Galvanized steel and copper clad hangers do not require paint.

3.3.4 Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated, or by other recognized industry methods.

3.3.5 Provision for Movement:

3.3.5.1 Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.

3.3.5.2 Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

3.3.5.3 Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and so that maximum pipe deflections allowed by ANSI B31 are not exceeded.

3.3.6 Insulated Piping: Comply with the following installation requirements.

3.3.6.1 Shields: Where low-compressive-strength insulation or vapor barriers are indicated, install coated protective shields.

3.3.6.2 Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.

3.3.7 Support fire protection piping independently of other piping.

3.4 Installation of Anchors:

3.4.1 Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B31, and to prevent transfer of loading and stresses to connected equipment.

3.4.2 Fabricate and install anchors by welding steel shapes, plates and bars to piping and to structure. Comply with ANSI B31 and with AWS standards.

3.4.3 Anchor Spacings: Where not otherwise indicated, install anchors at ends of principal pipe-runs, at intermediate points in pipe-runs between expansion loops and elbows. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

3.4.4 Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions to limit movement of piping and forces to maximums recommended by manufacturer for each unit.

3.5 Equipment Bases:

3.5.1 Provide concrete housekeeping bases for all floor mounted equipment furnished as part of the work of Division 23. Size bases to extend minimum of 4" beyond equipment base in any direction; and 4" above finished floor elevation. Construct of reinforced concrete, roughen floor slab beneath base for bond, and provide steel rod anchors between floor and base. Locate anchor bolts using equipment manufacturer's templates. Chamfer top and edge corners.

3.5.2 Provide structural steel stands to support equipment not floor mounted or hung from structure. Construct of structural steel members or steel pipe and fittings. Provide factory-fabricated tank saddles for tanks mounted on steel stands. Prime and paint with black enamel.

END OF SECTION 2305

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SECTION 230548 - VIBRATION ISOLATION

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-23 section making reference to vibration isolation equipment.

1.3 Extent of vibration isolation required by this section is indicated on drawings and/or specified in other Division-23 sections.

1.4 Approval Submittals: When required by other Division-23 sections, submit product data sheets for each type of vibration isolation equipment including configuration and rating data. Submit with Division-23 section using vibration isolation, not as a separate submittal. Provide calculations showing supported weight, deflection, and isolator size and type for each item of supported equipment. Submit for:

Equipment Mountings. Type EM.
Hangers. Type HA.
Bases and Frames. Type BF.
Pipe Flexible Connections. Type PF.

1.5 O&M Data Submittals: Submit a copy of approval submittals for each type of vibration isolation equipment. Include this data in O&M Manual.

2 PRODUCTS

2.1 General: Provide factory-fabricated products recommended by manufacturer for use in service indicated. Provide products of types and deflections indicated; provide proper selection as determined by Installer to comply with specifications and installation requirements. Provide sizes which properly fit with equipment. All metal parts installed outside shall be hot dipped galvanized after fabrication.

2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide vibration isolation equipment of: Mason Industries, Keflex, Consolidated Kinetics, Vibration Mountings & Controls, Wheatley or approved equal. All vibration isolators shall be supplied by a single approved manufacturer.

2.3 Equipment Mountings:

2.3.1 Select mountings with the required deflection and fastening means. Provide steel rails or bases as required to compensate for equipment rigidity and overhang.

2.3.2 Types of equipment mountings (EM):

1 Spring Mountings (EM1): Spring isolators shall be free-standing and laterally stable without any housing. All mounts shall have leveling bolts. Spring diameter shall be not less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Springs shall be so designed that the ratio of horizontal stiffness to vertical stiffness is approximately one. Provide a nominal static deflection of at least 1.0". Basis of Design: Mason Industries

SLFH.

2 Spring Mountings with Housings (EM2): Spring isolators shall consist of open, stable steel springs and include vertical travel limit stops to control extension when weight is removed. The housing of the spring unit shall serve as blocking during erection of equipment. Provide a nominal static deflection of at least 1.0". All mountings used outside shall be hot dipped galvanized. Basis of Design: Mason Industries SLR.

3 Spring Mountings with Housings (EM3): Spring isolators shall consist of open, stable steel springs with neoprene inserts to limit movement between upper and lower housing on start and stop. Provide a nominal static deflection of at least 1.0". Mountings shall be specifically designed for critical areas on light-weight floors. Basis of Design: Mason Industries C.

4 Neoprene Mountings (EM4): Double deflection neoprene-in-shear mountings shall have a minimum static deflection of 0.35". All metal surfaces shall be neoprene covered. The top and bottom surfaces shall be neoprene ribbed and bolt holes shall be provided in the base. Basis of design: Mason Industries ND.

5 Pads (EM5): Waffle or ribbed pattern neoprene pads shall be fabricated from 40-50 durometer neoprene. Provide rigid steel plate and mounting angles as required. Basis of design: Mason Industries Super W.

2.4 Hangers:

2.4.1 Select hangers with the required deflection. Provide all required hanger rods and fasteners.

2.4.2 Types of hangers (HA):

1 Hangers (HA1): Vibration hangers shall contain a steel spring set in a neoprene cup manufactured with a grommet to prevent short-circuiting of the hanger rod. The cup shall contain a steel washer designed to properly distribute the load on the neoprene and prevent its extrusion. Spring diameters and hanger box lower-hole sizes shall be large enough to permit the hanger rod to swing through a 30-degree arc before contacting the hole and short circuiting the spring. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Basis of Design: Mason Industries 30.

2 Hangers (HA2): Vibration hangers shall contain a laterally stable steel spring and 0.3" deflection neoprene or fiberglass element in series. A neoprene neck shall be provided where the hanger rod passes through the steel box supporting the isolator mount to prevent metal to metal contact. Spring diameters and hanger box lower hole sizes shall be large enough to permit the hanger rod to swing through a 30 degree arc before contacting the hole and short circuiting the spring. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Basis of Design: Mason Industries 30N.

3 Hangers (HA3): Double deflection neoprene-in-sheer or EPDM hangers. Units shall be complete with projected neoprene bushing to prevent steel-to-steel contact between hanger box and hanger rod. Average static deflection shall be not less than 0.4 inches. Basis of Design: Mason Industries HD.

2.5 Bases and Frames (BF):

2.5.1 Select mounting bases and frames as required for equipment dimensions, service access and

fastening means. Provide all fasteners. Coordinate and provide required vibration isolators to match mounting bases and frames.

2.5.2 Types of bases and frames (BF):

1 Steel Base Frame for Floor-Mounted Equipment (BF1): Provide frames consisting of structural steel sections sized, spaced and connected to form a rigid base which will not twist, rack, deform or deflect in any manner that will negatively affect the operation of the supported equipment or the performance of the vibration-isolation mounts. Frames shall be of adequate size and plan form to support basic equipment units and motors plus any associated pipe elbow or duct elbow supports and electrical control elements or other components closely related and requiring resilient support in order to prevent vibration transfer from equipment to the building structure. Frames shall include side mounting brackets for attachment to vibration isolation floor mounts. The clearance between the underside of any frame or mounted equipment unit and the top of the building structure below shall be at least 2 inches. Basis of Design: Mason Industries WFSL.

2 Concrete Inertia Block for Floor-Mounted Equipment (BF2): Provide concrete inertia blocks formed of stone-aggregate concrete (150 lbs./cu.ft.) cast between appropriate steel reinforcing perimeter structural steel channels. Inertia block thickness shall be not less than 1/12 the longest dimension of the mounted equipment or equipment assembly. Inertia blocks shall be built to form a rigid base which will not twist, rack, deform, deflect or crack in any manner that will negatively affect the operation of the supported equipment or the performance of the vibration-isolation mounts. Inertia blocks shall be of adequate size and plan form to support basic equipment units and motors plus any associated pipe or duct elbow supports, electrical control elements or other components closely related and requiring resilient support in order to prevent vibration transfer from equipment to the building structure. Inertia blocks shall include side mounting bracket pockets for spring mounting. The clearance between the underside of any inertia block and the top of the building structure below shall be at least 2 inches. The vibration isolator supplier may furnish the structural steel perimeter frame, including reinforcing and anchor bolts. Basis of Design: Mason Industries KSL/BMK.

3 Steel Rails (BF3): Provide steel rails of channels or angles with vibration isolators as required. Basis of Design: Mason Industries, RND or RC.

4 Vibration Isolation Base for Rooftop Equipment (BF4): Provide aluminum vibration isolation bases that fit over roof curb and under the equipment. Provide spring isolators having a 1" minimum static deflection, resilient snubbers for wind resistance, closed cell weather seal at top and bottom, and EDPM flexible connection around entire perimeter. The unit shall provide a water-tight system. Basis of Design: Mason Industries CMAB.

5 Vibration Isolation Curb for Rooftop Equipment (BF5): Provide steel spring isolation curb with cadmium or zinc electroplated steel springs on ¼" thick neoprene pads to support the upper frame. The upper frame must provide continuous support for the equipment and must be held captive by ¼" thick neoprene snubber bushings. Minimum spring deflection is 1½" . Provide galvanized steel counter-flashing and EPDM bellows for the corners. Provide access covers for all springs. The entire assembly shall be waterproof. Curbs shall be a minimum of 12" high and shall include 2" thick insulation. Provide curbs designed to accommodate for roof pitch so that equipment is set level.

Provide perimeter angle and cross members with two layers of 5/8" waterproof sheetrock at the floating member of the curb. Stagger sheetrock joints. Sheetrock must completely surround all ducts and shall be caulked. Where the mechanical arrangement prevents

attaching to the floating member, the barrier shall be attached as high as possible on the fixed curb with 1" thick closed cell neoprene flexible seals around the ducts. A 4" layer of 1.5 pcf fiberglass shall cover the entire solid roof surface under the unit. Basis of Design: Mason Industries RSC-dB.

2.6 Pipe Flexible Connections:

2.6.1 Select pipe flexible connections suitable for duty indicated with ends to match piping system.

2.6. Types of pipe flexible connections (PF):

1 Pump Connections (PF1): Provide EPDM and dacron or neoprene and nylon flexible connectors rated at 200 psi and 250ºF. Connectors shall have the number of spheres required and ductile iron floating flanges with baked enamel finish. Provide control rods or cables as required for each application. Basis of Design: Mason Industries SFDEJ with reinforcing rings.

2 Chiller Connections (PF2): Provide EPDM and dacron or neoprene and nylon flexible connectors rated at 200 psi and 250ºF. Connectors shall have the number of spheres required and ductile iron floating flanges with baked enamel finish. Provide control rods or cables as required for each application. Basis of Design: Mason Industries SFEJ.

3 Coil Connections (PF3): Provide EPDM and dacron or neoprene and nylon flexible connectors rated at 200 psi at 250ºF. Connectors shall have the number of spheres required and ductile iron floating flanged or threaded ends with baked enamel finish. Provide control rods or cables as required for each application. Basis of Design: Mason Industries SFU or SFEJ as required.

4 Stainless Steel Flexible Hoses (PF4): Provide 300 psi working pressure flexible hoses with corrugated seamless hose body and braided cover. Basis of Design: Mason Industries BSS threaded or RF flanged, as required.

5 Bronze Flexible Hoses (PF5): Provide 300 psi working pressure flexible hoses with corrugated bronze hose body and braided cover. Basis of Design: Mason Industries BBF with sweat ends.

3 EXECUTION

3.1 Install vibration isolation devices for the duty indicated and for ease of inspection, adjustment, and proper operation. Install in accordance with the manufacturer's written instructions and coordinate with shop drawings of supported equipment.

3.2 All connections to fixtures and equipment shown on the drawings shall be considered diagrammatic unless otherwise indicated by detail. The actual connections shall be made to fully suit the requirements of each case and adequately provide for expansion and servicing.

3.3 Piping, ductwork and conduit shall not be suspended from one another or physically contact one another. Vibrating systems shall be kept free from non-vibrating systems.

3.4 Equipment Mountings:

3.4.1 Unless otherwise shown or specified, all floor-mounted equipment shall be set on housekeeping equipment bases. Refer to Division-23 section “Supports, Anchors, and Seals”.

3.4.2 No equipment unit shall bear directly on vibration isolators unless its own frame is suitably rigid to span between isolators, and such direct support is approved by the equipment manufacturer. All support frames shall be sufficiently stiff and rigid so as to prevent distortion and misalignment of components installed thereon.

3.4.3 Align equipment mountings for a free, plumb installation. Isolators that are binding, offset or fully compressed will not be accepted.

3.5 Hangers:

3.5.1 Position vibration isolation hangers so that hanger housing may rotate a full 360 degrees without contacting any object.

3.5.2 Install steel angles, channels, rods and fasteners to level equipment, piping or ductwork and to evenly distribute the supported weight.

3.6 Bases and Frames:

3.6.1 Unless otherwise indicated, all equipment mounted on vibration-isolated bases shall have a minimum operating clearance of 2 inches between the structural steel frame and the concrete housekeeping pad or floor beneath the equipment. The clearance space shall be checked to ensure that no construction debris has been left to short-circuit or restrict the proper operation of the vibration isolation system.

3.7 Pipe Flexible Connections:

3.7.1 Piping connected to vibration isolated equipment shall be installed so that it does not strain or force out of alignment the vibration isolators supporting the basic equipment, nor shall pipes restrict such equipment from "floating" freely on its respective vibration isolation system. Flexible connections shall be used to eliminate transferring vibration along piping.

3.7.2 Flexible connections and hoses shall not be used to compensate for pipe misalignment. Units shall be aligned so that the flexible connection is not distorted perpendicular to the axis of the piping.

3.7.3 Install flexible connections in pump suction and discharge, chiller inlet and outlet, water coil inlet and outlet and where shown on the drawings or required by equipment specifications.

3.7.4 Drain piping connected to vibrating equipment shall not physically contact any building construction or non-isolated systems or components.

3.8 Connections of Ducts: Ducts shall be connected to fan intakes and discharges by means of flexible connectors in accordance with Division-23 section "Ductwork Accessories" so that all vibrating equipment is fully isolated.

END OF SECTION 230548

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SECTION 230553 - MECHANICAL IDENTIFICATION

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-23 section making reference to or requiring identification devices specified herein.

1.3 Extent of mechanical identification work required by this section is indicated on drawings and/or specified in other Division-23 sections.

1.4 Refer to Division-26 sections for identification requirements of electrical work; not work of this section. Refer to other Division-23 sections for identification requirements for controls; not work of this section.

1.5 Codes and Standards: Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

2 PRODUCTS

2.1 General: Provide manufacturer's standard products of categories and types required for each application as referenced in other Division-23 sections. Where more than single type is specified for application, selection is Installer's option, but provide single selection for each product category.

2.2 Painted Identification Materials

2.2.1 Stencils: Standard fiberboard stencils, prepared for required applications with letter sizes generally complying with recommendations of ANSI A13.1 for piping and similar applications, but not less than 1-¼" high letters for ductwork and not less than ¾" high letters for access door signs and similar operational instructions.

2.2.2 Stencil Paint: Standard exterior type stenciling enamel; black, except as otherwise indicated; either brushing grade or pressurized spray-can form and grade.

2.2.3 Identification Paint: Standard identification enamel.

2.3 Plastic Pipe Markers

2.3.1 Pressure-Sensitive Type: Provide manufacturer's standard pre-printed, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers.

2.3.1.1 Lettering: Manufacturer's standard pre-printed nomenclature which best describes piping system in each instance, as selected by Architect/Engineer in cases of variance with name as shown or specified.

2.3.1.2 Arrows: Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic.

2.4 Valve Tags:

2.4.1 Brass Valve Tags: Provide 19-gage polished brass valve tags with stamp-engraved piping system abbreviation in ¼" high letters and sequenced valve numbers ½" high, and with 5/32" hole for fastener. Provide 1-½" diameter tags, except as otherwise indicated.

2.4.2 Plastic Laminate Valve Tags: Provide manufacturer's standard 3/32" thick engraved plastic laminate valve tags, with piping system abbreviation in ¼" high letters and sequenced valve numbers ½" high, and with 5/32" hole for fastener. Provide 1-½" square black tags with white lettering, except as otherwise indicated.

2.5 Engraved Plastic-Laminate Signs:

2.5.1 General: Provide engraving stock melamine plastic laminate, in the sizes and thicknesses indicated, engraved with engraver's standard letter style a minimum of 3/4" tall and wording indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.

2.5.2 Thickness: 1/16" for units up to 20 sq. in. or 8" length; 1/8” for larger units.

2.5.3 Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate the substrate.

2.5.4 Ceiling Grid Mounted Tags: White ½” lettering engraved in a ¾” black background, srewed parallel to the ceiling grid.

2.6 Stamped Nameplates: Provide equipment manufacturer's standard stamped nameplates for motors, AHUs, pumps, etc.

3 EXECUTION

3.1 Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

3.2 Ductwork Identification:

3.2.1 General: Identify air supply, return, exhaust, intake and relief ductwork with stenciled signs and arrows, showing ductwork service and direction of flow, in black or white. Example: **AHU-1 Supply ➔**

3.2.2 Location: In each space where ductwork is exposed, or concealed only by removable ceiling system, locate signs near points where ductwork originates or continues into concealed enclosures, and at 50' spacings along exposed runs.

3.2.3 Access Doors: Provide stenciled signs on each access door in ductwork and housings, indicating purpose of access (to what equipment) and other maintenance and operating instructions, and appropriate and procedural information.

3.3 Piping System Identification:

3.3.1 General: Install pipe markers of one of the following types on each system indicated to receive identification, and include arrows to show normal direction of flow:

3.3.1.1 Plastic pipe markers.

3.3.1.2 Stenciled markers, black or white for best contrast.

3.3.2 Locate pipe markers as follows wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces and exterior non-concealed locations.

3.3.2.1 Near each valve and control device.

3.3.2.2 Near each branch, excluding short take-offs for fixtures and terminal units; mark each pipe at branch, where there could be question of flow pattern.

3.3.2.3 Near locations where pipes pass through walls, floors, ceilings, or enter non-accessible enclosures.

3.3.2.4 At access doors, manholes and similar access points which permit view of concealed piping.

3.3.2.5 Near major equipment items and other points of origination and termination.

3.3.2.6 Spaced intermediately at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.

3.3.2.7 On piping above removable acoustical ceilings, except omit intermediately spaced markers.

3.3.3 The following piping shall be color-coded where exposed in mechanical and electrical rooms by completely painting the piping with the indicated color. Use standard colors where exposed in finished spaces. Use standard identification methods in concealed areas.

Fire protection piping - Red
Gas piping – Yellow

3.4 Valve Identification: Provide coded valve tag on every valve, cock and control device in each piping system; exclude check valves, valves within factory-fabricated equipment units, plumbing fixture faucets, convenience and lawn-watering hose bibs, and shut-off valves at plumbing fixtures, HVAC terminal devices and similar rough-in connections of end-use fixtures and units. Coordinate code with operating instructions. For valves located above acoustical lay in ceilings, provide an additional engraved plastic valve tag, mechanically affixed to the ceiling grid below the valve (white letters on black background). When multiple equipment and/or valve tags are installed in a room, orient all tags the same direction.

3.5 Valve Charts: Provide framed, glass covered valve charts in each mechanical room. Identify coded valve number, valve function, and valve location for each valve. Provide floor plan with approximate location of each valve identified.

3.6 Mechanical Equipment Identification: Install engraved plastic laminate sign on a vertical surface on or near each major item of mechanical equipment and each operational device. Label shall indicate type of system and area served. For equipment located above acoustical lay in ceilings, provide an additional engraved plastic valve tag, mechanically affixed to the ceiling grid below the valve (white letters on black background). When multiple equipment and/or valve tags are installed in a room, orient all tags the same direction. Provide signs for the following general categories of equipment and operational devices:

3.6.1 Main control and operating valves, including safety devices.

3.6.2 Meters, gauges, thermometers and similar units.

3.6.3 Fuel-burning units including boilers, furnaces, and heaters.

3.6.4 Pumps, compressors, chillers, condensers, and similar equipment.

3.6.5 Heat exchangers, coils, evaporators, cooling towers, heat recovery units and similar equipment.

3.6.6 Fans, blowers, primary balancing dampers and VAV boxes.

3.6.7 HVAC air handlers and fan coil units.

3.6.8 Air conditioning indoor and outdoor units.

3.7 Stamped Nameplates: Equipment manufacturers to provide standard stamped nameplates on all major equipment items such as motors, pumps, AHUs, etc. Where motors are hidden from view (within equipment casing, or otherwise not easily accessible, etc.), the equipment supplier shall furnish a duplicate motor data nameplate to be affixed to the equipment casing in an easily visible location, unless data is already included on the equipment nameplate.]

3.8 Adjusting and Cleaning:

3.8.1 Adjusting: Relocate any mechanical identification device which has become visually blocked by work of this division or other divisions.

3.8.2 Cleaning: Clean face of identification devices, and glass frames of valve charts.

END OF SECTION 230553

SECTION 230573 - EXCAVATION & BACKFILL

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-23 section making reference to or requiring excavation and backfill specified herein.

1.3 Existing Utilities: Underground utilities shown were taken from old drawings. The exact location of these utilities and irrigation branches and abandoned services are not known. Use extreme caution when excavating.

1.4 Refer to other Division-23 sections and/or drawings for specific requirements of the particular piping system being installed. Where another Division-23 section or the drawings conflict with requirements of this section, the other Division-23 section or the drawings shall take precedence over the general requirements herein.

1.5 OSHA: Contractor employee worker protection for all trenching and excavation operations shall comply with 29 CFR 1926.650 Subpart P and all current OSHA requirements.

1.6 Trench Safety Act: Contractor shall comply with all requirements of Florida Statutes Chapter 553, including the requirement to provide a separate line item to identify the cost to comply on a per lineal foot of trench and per square foot of shoring.

2 PRODUCTS

2.1 Sand: Clean, hard, uncoated grains free from organic matter or other deleterious substances. Sand for backfill shall be of a grade equal to mortar sand.

2.2 Gravel: Clean, well graded hard stone or gravel, free from organic material. Size range to be from No. 4 screen retentions to 1".

2.3 Earth: Fill free of clay, muck, stones, wood, roots or rubbish.

2.4 Identification Tape: Polyethylene 6 inches wide, 0.004 inches thick, continuously printed with "CAUTION" in large letters and type of pipe below.

2.5 Copper Identification Wire: 14-gauge.

3 EXECUTION

3.1 Ditching and Excavation: Shall be performed by hand wherever there is a possibility of encountering obstacles or any existing utility lines of any nature whatsoever. Where clear and unobstructed areas are to be excavated, appropriate machine excavation methods may be employed. Avoid use of machine excavators within the limits of the building lines.

3.2 Bedding: Excavate to bottom grade of pipe to be installed, and shape bed of undisturbed earth to contour of pipe for a width of at least 50% of pipe diameter. If earth conditions necessitate excavation below grade of the pipe, such as due to the presence of clay, muck, or roots, subcut and bring bed up to proper elevation with clean, new sand (as described in paragraph

2.1), deposited in 6" layers and tamped. Notify Architect/Engineer if subcut exceeds 12", or if bed is of an unstable nature. In this case a 6" minimum layer of gravel will be required before sand bedding begins. Submit cost proposal if the earth conditions require subcut in excess of 12" or if gravel is required to achieve proper bedding.

3.3 Placing: Pipe shall be carefully handled into place. Avoid knocking loose soil from the banks of the trench into the pipe bed. Rig heavier sections with nylon slings in lieu of wire rope to avoid crushing or chipping. Pipe which is handled with insulation in place, coated pipe, and jacketed pipe shall have special handling slings as required to prevent damage to the material.

3.4 Backfilling: Deposit clean new sand (as described in paragraph 2.1) to 6" above the pipe and tamp. Then deposit sand or earth carefully in 6" layers, maintaining adequate side support, especially on nonferrous piping materials. Compact fill in 6" layers, using mechanical means, up to the top elevation of the pipe, and in 12" layers to rough or finish grade as required. Fine grade and restore surface to original condition.

3.5 Special: Excavations shall be installed and maintained in satisfactory condition during the progress of the work. Subsurface structures are to be constructed in adequately sized excavations. De-watering equipment shall be installed and properly maintained where required. Shoring shall be employed in the event of unstable soil condition, and in all cases where required by OSHA regulations and necessary to protect materials and personnel from injury.

3.6 Identification: Install identification tape directly above all underground piping, one tape for each pipe where multiple pipes are installed. Depth of tape shall be at least 6 inches below finished grade and 24" above buried pipe. Install copper wire above non-metallic pipes.

3.7 Depth of Cover: Minimum cover for underground piping is two feet unless indicated otherwise.

END OF SECTION 230573

SECTION 230590 - START-UP REQUIREMENTS FOR HEATING, VENTILATING, & AIR CONDITIONING (HVAC) SYSTEMS

1 GENERAL

1.1 Intent: It is the intent of this section to require that the startup requirements and report noted herein be performed prior to starting TAB work on each system. Work can be phased with permission of the Engineer.

1.2 Coordination:

1.2.1 The Contractor shall furnish to the TAB Contractor a complete set of plans, specifications, addenda, shop drawings, equipment performance data sheets, change orders, etc. as requested by the TAB Contractor.

1.2.2 The Contractor shall participate in a TAB coordination meeting to discuss interface requirements with the TAB Contractor and to establish a schedule for TAB work prior to start of TAB work. The TAB will be performed by an independent company contracted by the owner.

1.3 Test Reports and Verification Submittals:

1.3.1 Submit Startup Report as described herein for each system. Attach Factory Startup Report for equipment as required by other Division-23 sections.

2 PRODUCTS: None

3 EXECUTION:

3.1 The TAB work shall not commence until the Engineer has received written notice from the Contractor that HVAC systems are 100% complete and are fully operational. Submit Startup Report as described herein.

3.2 The Contractor shall place all HVAC systems and equipment into complete operation during each working day of TAB work.

3.3 The Contractor shall provide access to HVAC systems and equipment by supplying ladders and/or scaffolding, and opening access panels and equipment room doors.

3.4 The TAB Contractor will provide to the Contractor TAB punch lists of non-complying HVAC work as they are discovered. The Contractor shall replace or repair non-complying work as soon as possible in order not to delay completion of TAB work.

3.5 Airside Systems: The Contractor shall provide the following information to the Engineer to substantiate proper start-up and preliminary adjustments of air handler units, belt driven fans, and duct systems.

3.5.1 Verify that air grilles (supply, return, exhaust, transfer, outdoor, etc.) are installed and connected to the duct system.

3.5.2 Verify that duct systems are clean of debris.

3.5.3 Verify that ducts attached with flexible connectors are aligned within ½" and have a uniform gap between ducts of 1"-1.5". Flexible connectors shall not leak and shall be insulated.

3.5.4 Verify that filters are clean and filter spacers are installed.

3.5.5 Verify that balancing dampers at grilles and branch ducts are operational and are fully opened.

3.5.6 Verify that fire and smoke dampers are correctly installed and are fully opened.

3.5.7 Verify that fan discharges are appropriate for the outlet ductwork with regards to the "system effect" per AMCA Publication 201. Inappropriate fan discharges will not be accepted.

3.5.8 Verify proper fan rotation.

3.5.9 Verify proper belt drive alignment.

3.5.10 Verify fan motor overload elements are correctly sized.

3.5.11 Adjust fan sheave until CFM is at or above design CFM. Provide additional sheaves and belts as required. Verify that motor is not overloaded.

3.5.12 Verify that HVAC control systems are fully operational.

3.6 Hydronic Systems: The Contractor shall provide the following information to the Engineer to substantiate proper start-up and preliminary adjustments of HVAC pumps and piping systems.

3.6.1 Verify that the hydronic systems are properly flushed, filled, vented, purged and chemically treated and that all leaks are repaired. Verify proper air venting.

3.6.2 Verify that the correct strainer screens are clean and installed.

3.6.3 Verify that pump/motor shafts are correctly aligned.

3.6.4 Verify proper pump rotation and flow direction.

3.6.5 Verify that all balancing valves and circuit setters are fully opened.

3.6.6 Verify that test ports, pressure gauges and thermometers are properly installed and are accessible at coils, boilers, pumps, and chillers. Extensions to allow for pipe insulation are required. Pressure gauges at pumps must utilize pump taps in order for head measurements to correlate with the pump performance curves.

3.6.7 Verify pump motor overload elements are correctly sized.

3.6.8 Adjust balancing valve at pump discharge until GPM is at or greater than design GPM. Verify motor is not overloaded.

3.6.9 Provide flow meter data (IN WC and GPM), pump performance chart with flow data plotted, actual motor volts/amps, rated motor volts/amps and motor overload element capacity.

3.6.10 Verify that HVAC control systems for coils, boilers, and chillers are fully operational.

3.7 VAV Systems: The Contractor shall provide the following information to the Engineer to substantiate the proper start-up and preliminary adjustments of variable air volume boxes and control systems.

3.7.1 Verify that the inlet duct to the box is straight for a minimum of five (5) inlet duct diameters.

3.7.2 Verify that the discharge duct from the box has no branch takeoffs within five (5) feet of the box discharge.

3.7.3 Set the box thermostat to 85ºF. Verify that the box modulates to minimum cooling, and the heating activates.

3.7.4 Set the box thermostat to 55ºF. Verify that the reverse operation occurs and the box modulates to maximum cooling.

3.7.5 Set box thermostat to 75ºF. Deadband shall not exceed 2ºF.

3.7.6 Set minimum and maximum CFM based on manufacturer's calibration curves.

3.7.7 Verify that the static pressure probe is located 75% of the distance down the longest duct run. Mark the location of the probe on the as-builts and notify the TAB Contractor of same.

3.7.8 Verify that the static pressure control properly modulates the AHU fan's variable frequency drive. Set static pressure controller to maintain 1 in. w.g. as the initial setting.

3.7.9 Verify that the supply air temperature controller properly modulates the chilled water control valve. Set controller to maintain 55ºF. Verify that all heating coil control valves are properly modulated.

3.8 Startup Report: The Contractor shall submit the startup information required by this section to the Engineer in a typed report organized as outlined herein. The Startup Report is required to meet the written notice described herein prior to starting TAB work. TAB work will not start until the Startup Report has been submitted and approved.

END OF SECTION 230590

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SECTION 230591 - TESTING, CLEANING, AND STERILIZATION OF PIPING SYSTEMS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-23 section making reference to or requiring the testing and other procedures specified herein.

1.3 Notify the Architect/Engineer when system tests are ready to be witnessed at least 24 hours prior to the test.

1.4 All materials, test equipment, and devices required for cleaning, testing, sterilizing or purging shall be provided by the Contractor.

2 PRESSURE TESTS

2.1 General: Provide temporary equipment for testing, including pump and gauges. Test piping systems before insulation is installed wherever feasible, and remove control devices before testing. Test each natural section of each piping system independently but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating. Fill each section with indicated medium and pressurize for indicated pressure and time.

2.2 Required test period is four hours.

2.3 No piping, fixtures, or equipment shall be concealed or covered until they have been tested. The contractor shall apply each test and ensure that it is satisfactory for the period specified before calling the Architect/Engineer to observe the test. Test shall be repeated upon request to the satisfaction of those making the inspection.

2.4 Observe each test section for leakage at the end of the test period. Test fails if leakage is observed or if pressure drop exceeds 5% of the test pressure.

2.5 Check of systems during application of test pressures should include visual check for water leakage and soap bubble or similar check for air and nitrogen leakage.

2.6 During heating and cooling cycles, linear expansion shall be checked at all elbows and expansion joints for proper clearance.

2.7 Repair piping systems sections which fail required piping test. Disassemble and re-install using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.

2.8 Pressure Test Requirements:

2.8.1 Soil, Waste, and Vent Test all piping within the building with a 10 foot head of water. Test piping in sections so that all joints are tested. Provide test tees as required.

2.8.2 Domestic Water: Perform hydrostatic test on all piping within the building at twice the normal static pressure at service point, but not less than 100 psig. Once tested, flush out piping and leave under pressure of the supply main or 40 psig for the balance of the construction period.

2.8.3 Chilled Water and Heating Hot Water Perform hydrostatic test at 150% of the normal operating pressure, but not less than 100 psig.

2.8.4 Fire Sprinkler System: Perform hydrostatic test at 200 psig.

2.8.5 Gas: Test with air or nitrogen at 150% of normal working pressure, but not less than 25 psig. The test and check for leaks shall be in accordance with NFPA-54.

3 CLEANING AND STERILIZATION

3.1 General: Clean exterior surfaces of installed piping systems of superfluous materials, and prepare for application of specified coatings (if any). Flush out piping systems with clean water or blowdown with air before proceeding with required tests. Inspect each run of each system for completion of joints, supports and accessory items.

3.2 Flush and drain all water systems at least three times. Reverse flush systems from smallest piping to largest piping. Replace startup strainers with operating strainers.

3.3 Blowdown all gas systems with air or nitrogen (at a rate of flow exceeding design) at least three times or until no residue shows at each outlet. Reverse blowdown systems from smallest piping to largest piping.

3.4 Sterilization of Domestic Water Systems:

3.4.1 Prerequisites: All new hot and cold water piping installed (complete), all fixtures connected, system flushed out, and system filled with water.

3.4.2 The shut off valve at the water main shall be closed, all fixture outlets opened slightly, and a sterilizing solution shall be introduced at a manifold connection installed by the Contractor at the meter.

3.4.3 The solution shall contain 50 parts per million of available chlorine. The chlorinating material shall be either liquid chlorine or calcium hypochlorite. The solution shall be allowed to stand in the system for at least eight hours after which the entire system shall be flushed.

3.4.4 After final flushing, all aerators shall be removed, cleaned, and reinstalled. After final flush the residual chlorine shall not exceed 0.2 parts per million.

3.4.5 The Architect/Engineer shall be notified 24 hours prior to the procedure so that it can be witnessed.

3.4.6 Provide sampling and certified report by an independent testing lab. Provide written Health Department approval of disinfection samples.

3.5 Chilled Water and Heating Hot Water Pipe Cleaning: After completion of all work and operational check out of the HVAC installations and prior to acceptance of the project by the Owner, the following shall be accomplished. The completed piping systems shall be thoroughly flushed (reversed flushing) as needed to remove all dirt, debris, and any foreign matter that may have been trapped in the piping systems during construction. After flushing of systems is complete, the Contractor shall clean all main strainers and all strainers at air handlers, fan coil units, VAV boxes, reheat coils. A second cleaning of all strainers will be required if requested by the Engineer. Contractor shall furnish and install all valves and piping stub outs in the piping systems as needed to accommodate this flushing operation. Install the

valves and stub outs at a location and in a manner that will allow them to remain in place for future flushing operations. The flushing and strainer cleaning operations shall be witnessed and approved by the Engineer and Owner's representative.

3.6 Fuel Gas: Purge all fuel gas systems in accordance with NFPA 54.

END OF SECTION 230591

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SECTION 230593 - TESTING AND BALANCING OF MECHANICAL SYSTEMS

1 GENERAL

1.1 The work of this section is intended to be performed by a test and balance contractor under a separate, stand-alone contract.

1.2 Description of Work:

1.2.1 Extent of testing, adjusting, and balancing work (TAB) is indicated by requirements of this section, and also by drawings and schedules, and is defined to include, but is not necessarily limited to, air distribution systems, hydronic distribution systems and associated equipment and apparatus of mechanical work. The work consists of setting speed and volume (flow) adjusting facilities provided for systems, recording data, conducting tests, preparing and submitting reports, and recommending modifications to work as required.

1.2.2 Coordination: Coordinate with the General Contractor and Mechanical Contractor responsible for the HVAC system installation as required to complete the TAB work.

1.3 The intent of this specification is to balance HVAC systems within the tolerances listed, maintaining the pressure relationships indicated, with a minimum of noise.

1.3.1 Airflow Tolerances:

1.3.1.1 Air Handling: The supply air, return air and outdoor air quantities shall be balanced within 5% of design values.

1.3.1.2 Exhaust Fans: The exhaust fan quantities shall be set as required to maintain the design exhaust terminal flows within 5% of design values. If no exhaust terminals exist, exhaust fan air quantities shall be balanced within 10% of design values.

1.3.1.3 Terminal Units: The air quantities associated with VAV boxes, fan coil units, self-regulating air valves, unit heaters and other similar devices shall be balanced within 5% of design values.

1.3.1.4 Ceiling Diffusers, Supply Registers, Return and Exhaust Inlets: Balance to an air quantity within 10% of the design values.

1.3.2 Temperature Tolerances:

1.3.2.1 Air Handling Temperatures: The controlled temperatures at AHUs shall be verified to be under control within 1ºF of design values.

1.3.2.2 Hot Water Temperatures: The heating hot water controlled temperatures from boilers and heat exchangers and other similar devices shall be under control within 5ºF.

1.3.2.3 Chilled Water Temperatures: The chilled water controlled temperature from chillers shall be under control within 1ºF.

1.3.2.4 Room Temperatures: Balance systems and controls within 2ºF of indicated settings.

1.3.3 Hydronic Flow: Balance hydronic flow rates to within 10% of design values.

1.4 Quality Assurance: The TAB Contractor shall be located within 125 miles of the job site and

certified as one of the following:

1.4.1 Tester: A firm certified by National Environmental Balancing Bureau (NEBB) in those testing and balancing disciplines required for this project, who is not the Installer of the systems to be tested and is otherwise independent of the project. Comply with NEBB's "Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems" as applicable to this work.

1.4.2 Tester: A firm certified by Associated Air Balance Council (AABC) in those testing and balancing disciplines required for this project. AABC-certified firms are independent by definition. Comply with AABC's Manual MN-1 "AABC National Standards", as applicable to this work.

1.4.3 Industry Standards: Comply with American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) recommendations pertaining to measurements, instruments and testing, adjusting and balancing, except as otherwise indicated.

1.5 Job Conditions:

1.5.1 Do not proceed with testing, adjusting, and balancing work until HVAC work (including Controls) has been completed and is operable. Ensure that there is no residual work still to be completed.

1.5.2 Do not proceed until work scheduled for testing, adjusting, and balancing is clean and free from debris, dirt and discarded building materials.

1.5.3 Do not proceed until architectural work that would affect balancing (walls, ceiling, windows, doors) have been installed.

1.5.4 Testing may proceed system by system, but each HVAC system must be complete as describe herein.

1.5.5 The mechanical contractor shall make any changes in pulleys, belts, and dampers, and/or add dampers as required for correct balancing.

1.6 Approval Submittals

1.6.1 Submit the name of the proposed test and balance company for the Engineer's approval within thirty (30) days after awarding of contract.

1.7 Test Reports and Verification Submittals:

1.7.1 Submit four (4) copies of the dated test and balance report upon completion of TAB work. The report shall include a list of instruments used for the work. The report shall be signed by the supervisor who performed the TAB work.

2 PRODUCTS

2.1 Patching Materials: Except as otherwise indicated, use same products as used by original Installer for patching holes in insulation, ductwork and housings which have been cut or drilled for test purposes, including access for test instruments, attaching jigs, and similar purposes.

2.2 Test Instruments: Utilize test instruments and equipment of the type, precision, and capacity as recommended in the referenced standard. All instruments shall be in good condition and

shall have been calibrated within the previous six (6) months (or more recently if required by standard).

3 EXECUTION

3.1 General:

3.1.1 Examine installed work and conditions under which testing is to be done to ensure that work has been completed, cleaned and is operable. Do not proceed with TAB work until unsatisfactory conditions have been corrected in manner acceptable to Tester.

3.1.2 Test, adjust and balance environmental systems and components, as indicated, in accordance with procedures outlined in applicable standards, and as modified or detailed herein.

3.1.3 Test, adjust and balance systems during summer season for air conditioning systems and during winter season for heating systems, including at least a period of operation at outside conditions within 5ºF wet bulb temperature of maximum summer design condition, and within 10ºF dry bulb temperature of minimum winter design condition. When seasonal operation does not permit measuring final temperatures, then take final temperature readings when seasonal operation does permit. The Contractor shall return for a change of seasons test at no additional cost to the Owner and submit the revised TAB report.

3.1.4 Punch List: Prepare a deficiency (punch)list for the Contractor with a copy of the Engineer that lists all items that are incorrectly installed or are functioning improperly. Provide a retest after all items are corrected.

3.1.5 Prepare TAB report of test results, including instrumentation calibration reports, in format recommended by applicable standards, modified as required to include all data listed herein.

3.1.6 Patch holes in insulation, ductwork and housings, which have been cut or drilled for test purposes, in manner recommended by original Installer.

3.1.7 Permanently Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings at completion of TAB work. Provide markings with paint or other suitable permanent identification materials.

3.1.8 Include in the TAB report recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

3.1.9 Include an extended warranty of ninety (90) days after completion of test and balance work, during which time the Engineer, at his discretion, may request a recheck, or resetting of any component as listed in test report. The TAB company shall provide technicians and instruments and make any tests required by the Engineer during this time period.

3.2 Controls

3.2.1 Check all HVAC controls for proper location, calibration and sequence of operation.

3.2.2 Check operation of all controllers and controlled devices to verify proper action and direction. Check the operation of all interlocks.

3.2.3 Check all zone damper motors for leakage when in closed position. If leakage is more that 5%, mechanical contractor shall reset damper linkages.

3.2.4 Check all control valves for complete closure and correct action under all operating conditions.

3.3 Air Balancing

3.3.1 Leakage tests on ductwork must have been completed before air balancing.

3.3.2 Set dampers, volume controls and fan speeds to obtain specified air delivery with minimum noise level. Rebalance as required to accomplish this. Simulate fully loaded filters during test.

3.3.3 Set grille deflections as noted on plans. Modify deflections if required to eliminate drafts or objectionable air movement.

3.3.4 Record air terminal velocity after completion of balance work.

3.3.5 Record final grille and register deflection settings if different from that specified on contract drawings.

3.3.6 Record all fan speeds.

3.3.7 Variable Volume Systems: Measure static pressure at all major branches. Adjust fan controllers for minimum required static pressure at the end of each branch. Report the value of the minimum static pressure that will provide proper air flow in the TAB Report and set the static pressure controller for this value. Balance outlets. Check at both modulated and full cooling condition. Traverse main supply and return ducts. Balance the return system. All branches must be above the minimum required static pressure. The supply fan must track and deliver the proper air quantity with no objectionable noise. The system must be stable and operate properly at 30% load.

3.4 Water Balancing:

3.4.1 Verify proper operation of all hydronic system devices to ensure the proper flowrate, flow direction and pressure are maintained.

3.4.2 Set balancing cocks and flow control devices to obtain specified water flow rates to all terminal units, coils, chillers, cooling towers, boilers, and heat exchangers. Coordinate set point for variable speed drives to achieve balance with minimum pump speed. Report the value of the minimum differential pressure that will provide proper flow in the TAB Report and set the differential pressure controller for this value. Pump balancing cocks (if present) shall be fully open. Set maximum speed control for variable speed pumps.

3.4.3 Variable Speed Pumps: Verify proper operation of variable speed pumps and the associated distribution system at 30% and 100% flow.

3.5 Data Collection:

3.5.1 In addition to the data required for any specified performance tests, measure and record the temperatures, pressures, flow rates, and nameplate data for all components listed herein.

3.5.2 It is the intent of this section to record data on balanced systems, under normal operating or design conditions.

3.5.3 Temperatures:

1. Outside dry and wet bulb temperatures.

2. Dry bulb temperature in each room and at least one wet bulb temperature in each zone.
3. Inlet and outlet temperature of each heat exchange device - both fluids.

3.5.4 Pressures:

1. Suction and discharge static pressure of each fan.
2. Suction and discharge pressure of each pump.
3. Water pressure drop through each heat exchanger.

3.5.5 Flow rates:

1. Flow rate through each fan.
2. Flow rate through each pump.
3. Flow rate through each coil or heat exchange device.

3.5.6 Nameplate Data:

1. Complete nameplate data for all equipment.
2. Motor data to include horsepower, phase, voltage, RPM, full load nameplate current, fuse rating in disconnect switch, number or manufacturer's size designation, and ampere rating of overcurrent and low voltage protection devices in starters.

3.6 All test openings in ductwork and ductwork insulation shall be resealed in an approved manner.

END OF SECTION 230593

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SECTION 233113 - HVAC METAL DUCTWORK

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods Sections apply to work of this section.

1.3 Extent of HVAC metal ductwork is indicated on drawings and in schedules, and by requirements of this section.

1.4 Refer to other Division-23 sections for exterior insulation of metal ductwork.

1.5 Refer to other Division-23 sections for ductwork accessories.

1.6 Codes and Standards:

1.6.1 SMACNA Standards: Comply with SMACNA's "HVAC Duct Construction Standards, Metal and Flexible" 1985 Edition for fabrication and installation of metal ductwork, unless otherwise noted.

1.6.2 NFPA 90A Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

1.6.3 NFPA 96 Compliance: Comply with NFPA 96 "Standard for Installation of Equipment for Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment".

1.7 Approval Submittals:

1.7.1 Product Data: Submit manufacturer's technical product data and installation instructions for the following.

Factory-fabricated ductwork
Sealants
Duct liner
Adhesive
Flexible duct
Spin-in fittings
Side take-off fittings

1.7.2 Shop Drawings: Submit scaled layout drawings of HVAC metal ductwork and fittings including, but not limited to, duct sizes, locations, elevations, and slopes of horizontal runs, wall and floor penetrations, and connections. Show interface and spatial relationship between ductwork and proximate equipment. Show modifications of indicated requirements, made to conform to local shop practice, and how those modifications ensure that free area, materials, and rigidity are not reduced.

2 PRODUCTS

2.1 Ductwork Materials:

2.1.1 Exposed Ductwork Materials: Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including pitting, seam marks, roller marks, stains and discolorations, and other imperfections, including those which would impair painting.

2.1.2 Galvanized Sheet Metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A 527, lockforming quality; with G 90 zinc coating in accordance with ASTM A 525; and mill phosphatized for exposed locations. Stamp gauge and manufacturer's identification on each sheet. Break sheets so that identification is exposed.

2.1.3 Stainless Steel Sheet: Where indicated, provide 18-gauge stainless steel complying with ASTM A 167; Type 316; with No. 4 finish where exposed to view in occupied spaces. Provide No. 1 finish elsewhere. Protect finished surfaces with mill-applied adhesive protective paper, maintained through fabrication and installation.

2.2 Miscellaneous Ductwork Materials:

2.2.1 General: Provide miscellaneous materials and products of types and sizes indicated and, where not otherwise indicated, provide type and size required to comply with ductwork system requirements including proper connection of ductwork and equipment.

2.2.2 Duct Liner: Fibrous glass, 1½ pcf minimum density, complying with Thermal Insulation Manufacturers Association (TIMA) AHC-101; of thickness indicated. Certainteed "Coated Ultralite", Owens Corning "Aeroflex", PPG "Textrafine", or Manville "Linacoustic".

2.2.3 Duct Liner Adhesive: Comply with ASTM C 916 "Specifications for Adhesives for Duct Thermal Insulation".

2.2.4 Duct Liner Fasteners: Comply with SMACNA HVAC Duct Construction Standards, Article S2.11.

2.2.5 Duct Sealant: Provide non-hardening, non-migrating mastic or liquid elastic sealant, type applicable for fabrication/installation detail, as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork.

2.2.6 Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork. For exposed stainless steel ductwork, provide matching stainless steel support materials.

2.2.7 Flexible Ducts: Provide flexible ductwork with an R-value of R-6unless the ductwork is in a ceiling return plenum. The use of flexible ductwork for connection of supply air including terminal units and return air devices is acceptable only where shown on the drawings.

2.2.7.1 Construction: Provide reinforced metalized polyester jacket that is tear and puncture resistant, air tight inner core with no fiberglass erosion in the air stream and an encapsulated wire helix.

Flexible ductwork shall have a recommended operating pressure of 6" w.g. for sizes 4" through 12" diameter and 4" w.g. for sizes 14" through 20" diameter. All diameters shall be suitable for a negative operating pressure of 0.75" w.g. Flexible ductwork shall meet the requirements of UL-181, the Florida Energy Code, Florida Building Code, NFPA 90A and NFPA 90B.

2.2.7.2 Acceptable Manufacturers: Subject to compliance with requirements, provide R-6 flexible ductwork by: Atco 36, Flexmaster 8M-R6 or Thermaflex M-KE R6.

2.2.8 Spin-in and Side Take-off Fittings: Provide round branch run-outs as follows.

2.2.8.1 Spin in air device connections shall be straight sided spin in with damper and two inch high insulation stand-off equal to Crown 3720-DS.

2.2.8.2 Where duct height does not permit the use of spin-in fittings, use low profile side take-off fittings equal to Crown 3300-DS or Flexmaster STOD-BO.

2.2.9 Fittings: Provide radius type fittings fabricated of multiple sections with maximum 15° change of direction per section. Unless specifically detailed otherwise, use 45° laterals and 45° elbows for branch takeoff connections. Where 90° branches are indicated, provide conical type tees.

2.3 Fabrication:

2.3.1 Shop fabricate ductwork in 4, 8, 10 or 12-ft lengths, unless otherwise indicated or required to complete runs. Preassemble work in shop to greatest extent possible, so as to minimize field assembly of systems. Disassemble systems only to extent necessary for shipping and handling. Match-mark sections for reassembly and coordinated installation.

2.3.2 Shop fabricate ductwork of gauges and reinforcement complying with SMACNA "HVAC Duct Construction Standards", except provide sealant at all joints. Supply duct between AHU discharge and terminal units shall be minimum 4" pressure class. Duct downstream of terminal units, supply duct from low pressure air conditioning units, and all return and exhaust duct shall be minimum 2" pressure class unless otherwise noted.

2.3.3 Fabricate duct fittings to match adjoining ducts, and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with center-line radius equal to 1½ times associated duct width; and fabricate to include turning vanes in elbows where shorter radius is necessary. Limit angular tapers to 30° for contracting tapers and 20° for expanding tapers.

2.3.4 Fabricate ductwork with accessories installed during fabrication to the greatest extent possible. Refer to Division-23 section "Ductwork Accessories" for accessory requirements.

2.3.5 Fabricate duct plenums with duct liner where indicated. Laminate liner to internal surfaces of duct (100% coverage) in accordance with instructions by manufacturers of lining and adhesive, and fasten with mechanical fasteners (Grip Nails or Stic Klips) on 16 centers. On horizontal runs install top and bottom first and wedge sides between top and bottom. Apply a brush coat of fire retardant over all joints, visible cut edges, and leading edges to prevent erosion.

2.4 Factory-Fabricated Low Pressure Ductwork (Maximum 2" W.G.):

2.4.1 Material: Galvanized sheet steel complying with ASTM A 527, lockforming quality, with ASTM A 525, G90 zinc coating, mill phosphatized.

2.4.2 Gauge: 28-gauge minimum for round ducts and fittings, 4" through 8" diameter. 26-gauge minimum 9" through 14", 24-gauge minimum 15" through 26".

2.4.3 Elbows: One piece construction for 90° and 45° elbows 14" and smaller. Provide multiple gore construction for larger diameters with standing seam circumferential joint.

2.4.4 Divided Flow Fittings: 90° tees, constructed with saddle tap spot welded and bonded to duct fitting body.

2.4.5 Acceptable Manufacturers: Subject to compliance with requirements, provide factory-fabricated ductwork by Semco Mfg., Inc. or United Sheet Metal Div., United McGill Corp, or approved equal.

2.5 Factory-Fabricated High Pressure Ductwork (3" W.G. and Higher):

2.5.1 Round Ductwork: Construct of galvanized sheet steel complying with ASTM A 527 by the following methods and in minimum gauges listed.

Diameter	Minimum Gauge	Method of Manufacture
3" to 14"	26	Spiral Lockseam
15" to 26"	24	Spiral Lockseam
27" to 36"	22	Spiral Lockseam
37" to 50"	20	Spiral Lockseam
51" to 60"	18	Spiral Lockseam
Over 60"	16	Longitudinal Seam

Provide locked seams for spiral duct; fusion-welded butt seam for longitudinal seam duct.

Fittings and Couplings: Construct of minimum gauges listed. Provide continuous welds along seams.

Diameter	Minimum Gauge
3" to 36"	20
38" to 50"	18
Over 50"	16

2.5.2 Flat-Oval Ductwork: Construct of galvanized sheet steel complying with ASTM A 527, of spiral lockseam construction, in minimum gauges listed.

Maximum Width	Minimum Gauge
Under 25"	24

25" to 48"	22
49" to 70"	20
Over 70"	18

Fittings and Couplings: Construct of minimum gauges listed. Provide continuous weld along seams.

Maximum Width	Minimum Gauge
Under 37"	20
37" to 50"	18
Over 50"	16

2.5.3 Internally Insulated Duct and Fittings: Construct with outer pressure shell, 2" thick insulation layer, and perforated inner liner. Construct shell and liner of galvanized sheet steel complying with ASTM A 527, of spiral lockseam construction, use longitudinal seam for over 59", in minimum gauges listed.

Nominal Duct Diameter	Outer Shell	Inner Liner
3" to 12"	26 ga.	24 ga.
13" to 24"	24 ga.	24 ga.
25" to 34"	22 ga.	24 ga.
35" to 48"	20 ga.	24 ga.
49" to 58"	18 ga.	24 ga.
Over 59"	16 ga.	20 ga.

Fittings and Couplings: Construct of minimum gauges listed. Provide continuous weld along seams of outer shell.

Nominal Duct Diameter	Outer Shell	Inner Liner
3" to 34"	20 ga.	20 ga.
36" to 48"	18 ga.	20 ga.
Over 48"	16 ga.	20 ga.

Inner Liner for Straight Duct: Perforate with 3/32" holes for 22% open area. Provide metal spacers welded in position to maintain spacing and concentricity. Provide a plastic film between the perforated liner and insulation to act as a vapor barrier.

Inner Liner for Fittings: Solid sheet metal. Provide metal spacers welded in position to maintain spacing and concentricity.

2.5.4 Optional Ducts and Fittings: At Installer's option, provided that certified tests by Manufacturer show that rigidity and performance is equivalent to SMACNA standard gauge ductwork, provide ducts and fittings as follows:

Ducts: Construct of Manufacturer's standard gauge, with spiral lock seam and intermediate standing rib.

Fittings: Construct by fabricating with spot welding and bonding with neoprene-base cement in lieu of continuous weld seams.

2.5.5 Acceptable Manufacturers: Subject to compliance with requirements, provide factory-fabricated ductwork Semco Mfg., Inc. or United Sheet Metal Div., United McGill Corp., or approved equal.

3 EXECUTION

3.1 General: Examine areas and conditions under which HVAC metal ductwork is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Installation of Metal Ductwork:

3.2.1 General: Assemble and install ductwork in accordance with recognized industry practices which will achieve air-tight (5% leakage for systems rated 3" and under; 1% for systems rated over 3") and noiseless (no objectionable noise) systems, capable of performing each indicated service. Install each run with minimum number of joints. Align ductwork accurately at connections, within 1/8" misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and to prevent buckling. Support vertical ducts at every floor.

3.2.2 Supports: Install concrete inserts for support of ductwork in coordination with formwork, as required to avoid delays in work. Install self-drilling screw anchors in prestressed concrete or existing work.

3.2.3 Field Fabrication: Complete fabrication of work at project as necessary to match shop-fabricated work and accommodate installation requirements. Seal joints in round or oval ductwork with hard cast or shrink bands, and sheet metal screws, or by welding. High velocity rectangular ducts shall have approved joints and be made airtight with sealer or welding.

3.2.4 Routing: Locate ductwork runs, except as otherwise indicated, vertically and horizontally. Avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, details and notations or, if not otherwise indicated, run ductwork in shortest route which does not obstruct useable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building. Limit clearance to ½" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. In finished and occupied spaces, conceal ductwork from view by locating in mechanical shafts, hollow wall construction or above suspended ceilings, unless specifically noted as "Exposed". Do not encase horizontal runs in solid partitions, except as specifically shown. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.

3.2.5 Internally Lined Ductwork: Cover leading and trailing edge of duct liner with sheet metal nosing zee.

3.2.6 Electrical Equipment Spaces: Do not route ductwork through transformer vaults or other

electrical equipment spaces and enclosures.

3.2.7 Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gauge as duct. Overlap opening on 4 sides by at least 1½". Fasten to duct and substrate. Where ducts pass through fire-rated floors, walls, or partitions, provide firestopping between duct and substrate.

3.2.8 Coordination: Coordinate duct installations with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.

3.2.9 Installation: Install metal ductwork in accordance with SMACNA HVAC Duct Construction Standards. Fan discharge outlet ducts shall be installed correctly with regard to "system effect" per AMCA Publication 201.

3.3 Installation of Flexible Ducts:

3.3.1 Maximum Length: For any duct run using flexible ductwork, do not exceed 5'-0" extended length. Flexible duct shall only be allowed as detailed on the drawings.

3.3.2 Installation: Install in accordance with Section III of SMACNA's "HVAC Duct Construction Standards, Metal and Flexible". Support flexible ducts to eliminate pinching and kinking which would restrict flow.

3.3.3 Downstream of VAV Boxes: Peel back insulation and slide the inner core over the spin-in or diffuser neck, seal with duct sealant and install Panduit strap tightly. Slide insulation back over the inner core and install another Panduit strap over the insulation outer jacket. Tape is not acceptable.

3.3.4 Upstream of VAV Boxes: Install same as downstream, except use stainless steel worm-gear clamps instead of Panduit straps.

3.3.5 Seal all exposed edges of fiberglass insulation with glassfab and mastic.

3.4 Leakage Tests: After each duct system is completed, test for duct leakage in accordance with Sections 3 and 5 of the SMACNA HVAC Air Duct Leakage Test Manual. Test pressure shall be equal to pressure class of duct, less 0.5" static pressure. Repair leaks and repeat tests until total leakage is less than 5% of system design air flow for low pressure systems and less than 1% for systems rated over 3".

3.5 Equipment Connections: Connect metal ductwork to equipment as indicated, provide flexible connection for each ductwork connection to equipment mounted on vibration isolators, and/or equipment containing rotating machinery. Provide access doors as indicated.

3.6 Clean ductwork internally free of dust and debris. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration. Keep ducts closed with poly during construction to prevent contamination by construction dust and debris.

3.7 Balancing: Refer to Division-23 section "Testing, Adjusting, and Balancing" for air distribution balancing of metal ductwork; not work of this section. Seal any leaks in ductwork that become apparent in balancing process.

3.8 System Adjustment: Adjust the system to provide functional operation to the extent possible, and leave ready for Testing and Balancing work. It is not the intent of this section to provide final testing and balancing, but to leave the system operational with a minimum of noise.

END OF SECTION 233113

SECTION 233300 - DUCTWORK ACCESSORIES

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of ductwork accessories work is indicated on drawings and in schedules, and by requirements of this section.

1.4 Refer to other Division-23 sections for testing, adjusting, and balancing of ductwork accessories; not work of this section.

1.5 Codes and Standards:

1.5.1 SMACNA Compliance: Comply with applicable portions of both SMACNA "HVAC Duct Construction Standards, Metal and Flexible" and "Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems".

1.5.2 UL Compliance: Construct, test, and label fire dampers in accordance with UL Standard 555 "Fire Dampers and Ceiling Dampers". Construct, test and label smoke dampers in accordance with UL Standard 555S "Leakage Rated Dampers for use in Smoke Control Systems" .

1.5.3 NFPA Compliance: Comply with applicable provisions of NFPA 90A "Air Conditioning and Ventilating Systems" pertaining to installation of ductwork accessories.

1.6 Approval Submittals:

1.6.1 Product Data: Submit manufacturer's technical product data for each type of ductwork accessory, including dimensions, capacities, and materials of construction; and installation instructions as follows:

Low pressure manual dampers
Control dampers
Fire dampers
Smoke dampers
Duct access doors
Flexible connections

1.6.2 O&M Data Submittals: Submit manufacturer's maintenance data including parts lists for smoke dampers. Include this data, product data, and a copy of approval submittals in O&M manual.

2 PRODUCTS

2.1 Dampers:

2.1.1 Low Pressure Manual Dampers: Provide 16 gauge dampers of single-blade type (12" maximum blade width) or multiblade type. Damper blades to be gang-operated from a single shaft with nylon or ball bearings on each end. Provide indexed locking quadrant. Parallel or

opposed blade style is acceptable. Provide 2" standoff on locking quadrant for externally insulated duct.

2.1.2 Control Dampers: Extruded aluminum (6063-T5) damper frame shall not be less than 0.080" in thickness. Damper frame shall be 4" deep x 1", with duct mounting flanges on both sides of frame. Damper frame shall have a 2" mounting flange on the rear of the damper when installed as Extended Rear Flange install type. Aluminum frame shall be clear anodized to a minimum thickness of 0.7 mil deep. Frame shall be assembled using stainless steel screws. Welded frames shall not be acceptable. Actuators (motors) are provided by control contractor.

2.1.2.1 Blades shall be maximum 6.4" deep extruded aluminum (6063-T5) air-foil profiles with a minimum wall thickness of 0.06", clear anodized to a minimum thickness of 0.7 mil deep.

2.1.2.2 Blade seals shall be extruded silicone, secured in an integral slot within the aluminum blade extrusions and shall be mechanically fastened to prevent shrinkage and movement over the life of the damper. Adhesive or clip-on type blade seals will not be approved.

2.1.2.3 Hexagonal control shaft shall be $^{7}/_{16}$". It shall have an adjustable length and shall be an integral part of the blade axle. A field-applied control shaft shall not be acceptable. All parts shall be stainless steel.

2.1.2.4 Linkage hardware shall be aluminum and stainless steel, installed in the frame side, out of the airstream, and accessible after installation. Linkage hardware shall be complete with stainless steel cup-point trunnion screws to prevent linkage slippage. Linkage that consists of metal rubbing metal will not be approved.

2.1.2.5 Dampers shall be designed for operation in temperatures ranging from -40°F to 212°F.

2.1.2.6 Dampers shall be AMCA rated for Leakage Class 1A at 1 in w.g. static pressure differential. Standard air leakage data to be certified under the AMCA Certified Ratings Program.

2.1.2.7 Dampers shall be custom made to required size, with blade stops not exceeding 1¼" in height.

2.1.2.8 Dampers shall be opposed blade for modulating dampers or parallel blade action for open/shut dampers.

2.1.2.9 Dampers shall be installed in the following manner: Installed in Duct

2.1.2.10 Installation of dampers must be in accordance with manufacturer's current installation guidelines, provided with each damper shipment.

2.1.2.11 Field supplied intermediate structural support is required to resist applied pressure loads for dampers that consist of two or more sections in both height and width.

2.1.2.12 Acceptable Manufacturers: Subject to compliance with requirements, provide access doors by TAMCO (T.A. Morrison & Co, Inc), Pottorff, Ruskin, or approved equal.

2.1.3 Acceptable Manufacturers: Subject to compliance with requirements, provide dampers by Air Balance, American Warming & Ventilating, Arrow Louver and Damper, Penn Ventilator Co., or Ruskin Mfg. Co.

2.2 Fire and Smoke Dampers:

2.2.1 Fire Dampers: Provide curtain type fire dampers, UL classified and labeled per UL 555, of

types and sizes indicated. Construct casings and blades of galvanized steel. Damper shall not restrict duct free area when open. Dampers shall be rated for dynamic closure under flow and pressure. Provide sleeves and mounting angles. Provide fusible link rated at 160 to 165° F unless otherwise indicated. Provide damper with positive lock in closed position. All dampers shall be spring activated. Basis of design:

1-1/2 HR: Ruskin IBD2 - Style B for rectangular, Style CR for round, Style CO for oval.

1-1/2 HR: Ruskin IBDT for transfer grilles in narrow partitions.

3 HR: Ruskin IBD23 - Style B for rectangular, Style CR for round, Style CO for oval.

3.1.1 Smoke Dampers: Provide motorized smoke dampers, UL classified under UL-555S, of types and sizes indicated. Construct frame and blades of galvanized steel. Provide sleeves. Provide damper assembly complete with electric operator that will fail safe if fire interrupts operational power. Provide for remote testing or resetting capability after response to smoke detector operation. Entire assembly shall be rated at least leakage class II (10 CFM/sq. ft. at 1" w.g. at 250ºF). Basis of design:

Systems to 1,500 FPM duct velocity or 2.5" w.g.: Class II Ruskin SD36.

Systems over 1,500 FPM duct velocity or 2.5" w.g.: Class I, airfoil blades, Ruskin SD60.

3.1.2 Acceptable Manufacturers: Subject to compliance with requirements, provide fire and smoke dampers by Air Balance, Inc., American Warning & Ventilating, Arrow Louver and Damper, Penn Ventilator Co., or Ruskin Mfg. Co.

2.3 Turning Vanes: Provide manufactured or fabricated single wall turning vanes and vane runners, constructed in accordance with SMACNA "HVAC Duct Construction Standards".

2.4 Duct Access Doors:

2.4.1 General: Provide duct access doors of size indicated, or as required for duty indicated.

2.4.2 Construction: Construct of same or greater gauge as ductwork served. Provide insulated doors for insulated ductwork. Provide flush frames for uninsulated ductwork, extended frames for externally insulated duct. Provide one side hinged, other side with one handle-type latch for doors 12" high and smaller, 2 handle-type latches for larger doors.

2.4.3 Acceptable Manufacturers: Subject to compliance with requirements, provide access doors by Air Balance, Inc., Duro Dyne Corp., Ruskin Mfg. Co., or Ventfabrics, Inc.

2.5 Flexible Connections:

2.5.1 General: Provide flexible duct connections wherever ductwork connects to vibration isolated equipment. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibrations of connected equipment.

2.5.2 Acceptable Manufacturers: Subject to compliance with requirments, provide products by one of the following: Duro Dyne Corp., Flexaust (The) Co., or Ventfabrics, Inc.

3 EXECUTION

3.1 Examine areas and conditions under which ductwork accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Installation of Ductwork Accessories:

3.2.1 Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.

3.2.2 Install balancing dampers at all main ducts adjacent to units in return air, outside air and where indicated.

3.2.3 Install control dampers in the outside air duct and return air duct for each air handler. Damper operator provided by control contractor.

3.2.4 Install turning vanes in square or rectangular 90º elbows in supply, return, and exhaust air systems, and elsewhere as indicated.

3.2.5 Install access doors to open against system air pressure, with latches operable from either side, except outside only where duct is too small for person to enter. Install on entering air side of reheat coils. Install at fire dampers and smoke dampers. Opening size shall be per NFPA 90A for servicing fire and smoke dampers. Provide label with 1-1/2" letters to indicate location of fire protection devices—FIRE DAMPER ACCESS or SMOKE DAMPER ACCESS.

3.2.6 Install flexible connections in ductwork such that the clear length of the connector is approximately two inches. Provide thrust restraints as required. Flexible material shall not be so slack as to take a definite concave or convex shape during fan operation.

3.2.7 Coordinate with other work, including ductwork, as necessary to interface installation of ductwork accessories properly with other work.

3.2.8 Install fire dampers within fire walls and floors at locations shown on the mechanical drawings. Install in strict accordance with the manufacturer's printed instructions, NFPA 90A, and UL 555. Basis of design installation is detailed on the drawings

3.2.9 Install smoke dampers at locations shown on the mechanical drawings. Install in strict accordance with the manufacturer's printed instructions, NFPA 90A, and UL 555S. Basis of design installation is detailed on the drawings.

3.3 Smoke Dampers: Notify Engineer at least 24 hours in advance of ceiling installation or chase closure so that complete smoke damper installation can be observed. A copy of the manufacturer’s printed installation instructions shall be available at the site.

3.4 Operate installed ductwork accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories as required to obtain proper operation and leakproof performance.

3.5 Adjusting and Cleaning:

3.5.1 Adjusting: Adjust ductwork accessories for proper settings.

3.5.2 Final positioning of manual dampers is specified in Division-23 section "Testing, Adjusting, and Balancing". However, the system shall be left functional with all dampers open or throttled.

3.5.3 Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION 233300

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SECTION 233400 - FANS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of fan work required by this section as indicated on drawings and schedules, and by requirements of this section.

1.4 Coordination:

1.4.1 Refer to Division-7 sections for installation of prefabricated roof curbs; not work of this section. Furnishing prefabricated roof curbs is part of this section's work.

1.4.2 Refer to Division-23 section "Testing, Adjusting, and Balancing" for balancing of fans.

1.4.3 Refer to Division-23 HVAC control systems sections for control work required in conjunction with fans.

1.4.4 Refer to Division-26 sections for power supply wiring from power source to power connection on fans. Division-26 work will include starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.

1.5 Codes and Standards:

1.5.1 AMCA Compliance: Provide fans which have been tested and rated in accordance with AMCA standards, and bear AMCA Certified Ratings Seal.

1.5.2 UL Compliance: Provide fans which are listed by UL and have UL label affixed.

1.6 Approval Submittals:

1.6.1 Product Data: Submit manufacturer's technical data for fans, including specifications, capacity ratings, dimensions, weights, materials, accessories furnished, and installation instructions. Submit assembly-type drawings showing unit dimensions, construction details, methods of assembly of components, and field connection details.

Fans
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1.7 O&M Data Submittals: Submit maintenance data and parts list for each type of fan, accessory, and control. Include these data, a copy of approved submittals, and wiring diagrams in O&M Manual.

2 PRODUCTS

2.1 General: Except as otherwise indicated, provide standard prefabricated fans of type and size indicated, modified as necessary to comply with requirements, and as required for complete installation. Provide accessories as listed in the schedule on the drawings and as described herein. Motors shall be high efficiency per Division-23 section "Motors".

2.2 Acceptable Manufacturers: Subject to compliance with requirements provide fans manufactured by Acme, Greenheck, Loren Cook, Penn or approved equal unless otherwise noted herein.

2.3 Centrifugal Roof Exhausters:

2.3.1 Housing: Provide heavy gauge aluminum hood, housing, and base with a galvanized steel frame.

2.3.2 Fan Wheels: Provide aluminum air foil type, statically and dynamically balanced.

2.3.3 Drive: Provide direct or belt drive as scheduled with pre-lubricated, ball bearing, continuous duty type motors. Provide vibration isolation equipment for the entire drive.

2.3.4 Square Hood Fans: Where indicated provide low silhouette style fans. Hoods shall be hinged with locking device that operates in both the open and closed position.

2.3.5 Round Hood Fans: Where indicated provide fans with motors mounted in a separate compartment out of the air stream.

2.4 In-Line Centrifugal Fans:

2.4.1 Housing: Provide square weather tight housing constructed of aluminum or steel and painted inside and out with an epoxy finish. Provide venturi type inlet. Provide heavy duty duct collars. Housing and bearing supports shall be constructed of heavy gauge bolted and welded steel construction. Provide two sided access panels, located perpendicular to the motor mounting plane. Provide ½" insulated housing. Provide motor and drive cover for belt drive units.

2.4.2 Fan Wheels: Provide aluminum air foil type, backward curved, statically and dynamically balanced.

2.4.3 Drive: Provide direct or belt drive as scheduled with pre-lubricated, ball bearing, continuous duty type motors. Provide vibration isolation equipment for the entire drive.

2.4.4 Isolation and Support: Provide spring type vibration isolators and fan support brackets.

2.5 Centrifugal Ceiling Exhausters:

2.5.1 Fan Assembly: Provide steel housing, plastic or aluminum grille, backdraft damper, statically and dynamically balanced fan wheel, permanently lubricated motor with internal thermal overloads, vibration isolation and all required mounting hardware and brackets. Provide acoustically treated housing for all fans larger than 60 cfm. Mounting type shall be as indicated on the drawings or on the schedule.

2.5.2 Connectors: Provide adaptors, connectors, and eave elbows as required to connect fan discharges to outlets.

2.5.3 Outlets: Provide where shown on the drawings (or required by the installation) wall caps, vent caps, or roof jacks, each with birdscreen, to match fans and surrounding construction.

2.6 Vibration Isolation: Mount fans on vibration isolators in accordance with the requirements of

Division-23 section "Vibration Isolation" and the following list.

2.6.1 Hangers: Type HA2.

3 EXECUTION

3.1 General: Except as otherwise indicated or specified, install fans in accordance with manufacturer's installation instructions and recognized industry practices to insure that fans serve their intended function.

3.2 Coordinate fan work with work of roofing, walls, and ceilings as necessary for proper interfacing. Framing of openings, caulking, and curb installation is not work of this section.

3.3 Ductwork: Refer to Division-23 section "Ductwork". Connect ducts to fans in accordance with manufacturer's installation instructions. Provide flexible connections in ductwork at fans.

3.4 Install fans on vibration isolation equipment as required. Set level and plumb.

3.5 Roof Curbs: furnish roof curbs to roofing installer for installation.

3.6 Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to electrical Installer. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-26 sections. Verify proper rotation direction of fan wheels. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.

3.7 Remove shipping bolts and temporary supports within fans. Adjust dampers for free operation.

3.8 Testing: After installation of fans has been completed, test each fan to demonstrate proper operation of units at performance requirements specified. When possible, field correct malfunctioning units, then retest to demonstrate compliance. Replace units which cannot be satisfactorily corrected.

3.9 Cleaning: Clean factory-finished surfaces. Remove all tar and soil. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION 233400

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SECTION 233713 - GRILLES, REGISTERS AND CEILING DIFFUSERS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of air outlets and inlets work is indicated by drawings and schedules, and by requirements of this section.

1.4 Refer to other Division-23 sections for ductwork and duct accessories required in conjunction with air outlets and inlets and for balancing of air outlets and inlets; not work of this section.

1.5 Codes and Standards:

1.5.1 ADC Compliance: Test and rate air outlets and inlets in certified laboratories under requirements of ADC 1062 "Certification, Rating and Test Manual". Provide air outlets and inlets bearing ADC Certified Rating Seal.

1.5.2 NFPA Compliance: Install air outlets and inlets in accordance with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

1.6 Approval Submittals:

1.6.1 Product Data: Submit manufacturer's technical product data for air outlets and inlets indicating construction, finish, and mounting details.

1.6.2 Performance Data: For each type of air outlet and inlet furnished, provide aspiration ability, temperature and velocity traverses, throw and drop, and noise criteria ratings. Indicate selections and data as required.

1.7 O&M Data Submittals: Submit cleaning instructions for finishes and spare parts lists. Include this data and a copy of approval submittals in O&M manual.

2 PRODUCTS

2.1 General:

2.1.1 Except as otherwise indicated, provide manufacturer's standard grilles, registers, and ceiling diffusers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.

2.1.2 Manufacturers not listed in the following specification will not be considered for approval unless accepted by addendum prior to bid.

2.1.3 Performance: Provide grilles, registers and ceiling diffusers that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device equal to the basis of design.

2.1.4 Ceiling and Wall Compatibility: Provide grilles, registers and diffusers with border styles that are compatible with adjacent wall and ceiling systems, and that are specifically manufactured

to fit into ceiling module or wall with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems and walls which will contain each type of ceiling diffuser, grille, or register.

2.1.5 Appearance: All grilles and registers shall be aluminum construction and all diffusers shall be steel or aluminum construction, unless otherwise noted, with uniform matching appearance for each type of outlet. Ceiling mounted grilles and registers shall be set to be sight tight from the predominant exposure.

2.1.6 Finish: All ceiling mounted grilles, registers, and diffusers shall be finished with manufacturer's standard color to be selected by the architect. Wall and door mounted grilles and registers shall be finished with clear anodized finish .

2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products by Titus, Price, Krueger, or Metal Aire.

2.3 Rectangular Ceiling Diffusers: Provide rectangular face, adjustable diffuser with removable inner core, no corner joints. If square or rectangular neck is provided, provide square to round adaptor as required. Provide lay-in panel as required. Provide beveled trim ring for diffusers in hard ceilings.

2.4 Square Ceiling Diffusers: Provide square face, adjustable, 360 degree pattern diffusers with one-piece stamped cones, no corner joints, round necks. Provide lay-in panel as required.

2.5 Return Grilles : Provide return grilles with one set of 45 degree fixed louvers, parallel to the long dimension. Provide mounting frame for all wall and plaster ceiling installations.

2.6 Nozzle Diffusers: Provide heavy gauge aluminum nozzle diffusers with 75º of global rotation, 38º in any one direction from center. Provide flange for surface mounting. Provide felt gasket between nozzle and frame of ball and socket joint for a tight air seal.

3 EXECUTION

3.1 Coordinate installation with ceiling and light fixture installation. Locate ceiling outlets as indicated on architectural Reflected Ceiling Plans. Unless otherwise indicated, locate ceiling outlets in the center of acoustical ceiling modules with sides parallel to the grid.

3.2 Install air outlets and inlets in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended functions.

3.3 Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of air outlets and inlets with other work.

3.4 Set air volumes to values shown on the drawings so that the system is functional. Leave ready for test and balance contractor.

3.5 Furnish to Owner three operating keys for each type of outlet and inlet that require them; obtain receipt.

END OF SECTION 233713

SECTION 233723 ROOF-MOUNTED AIR INTAKES AND VENTS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Approval Submittals:

1.3.1 Product Data: Submit product data sheets showing dimensions, construction, weight, ratings, and installation instructions.

1.4 O&M Data Submittals: Include a copy of approval submittals in O&M manual.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide products by Acme Engineering & Manufacturing Corp., Greenheck Corp., Loren Cook, Penn Ventilator Co., Ruskin smoke hatches, or approved AMCA labeled equal.

2.2 Intakes and Vents: Provide hooded gravity ventilators, curb-mounted, of type and capacity shown on the drawings. Construct with heavy gauge aluminum hood, housing and base. Provide steel frame. Provide factory applied three-coat epoxy finish on hood. Provide hinged hood with approved locking device for both open and closed positions. Ventilators shall be low silhouette trimline style. Ventilators shall be Florida Product Approved.

2.3 Accessories:

2.3.1 Curbs: Provide minimum 12" high over finished roof surface (coordinate with roofer), roofed-over type, prefabricated aluminum curbs with treated wood nailer and 1-1/2" fire resistant fiberglass insulation sized to match the intakes or vents. For deck slopes of 1/4" per foot and more, fabricate curbs to form level top edge.

2.3.2 Bird Screens: Provide removable bird screens, 1/2" mesh, aluminum or hardware cloth as indicated in equipment schedule.

2.3.3 Backdraft Dampers: Provide where indicated aluminum louvered gravity dampers with felt-edged blades and nylon bearings. Mount in curb base.

3 EXECUTION

3.1 Coordinate ventilator work with roofing work as necessary for proper interfacing. Framing of openings, caulking, and curb installation is not work of this section.

3.2 Roof Curbs: Furnish curbs to roofing installer for installation.

3.3 Installation: Install in accordance with the manufacturer's written instructions. Anchor housing to curb with cadmium-plated self-tapping screws or lag bolts as dictated by curb construction. Installation shall be per requirements of manufacturer’s Florida Product Approval.

3.4 Refer to Division-23 ductwork sections. Connect ducts to ventilators in accordance with manufacturer's installation instructions.

3.5 Adjusting and Cleaning: Clean tar and other soil from housing and hood. Repair any marred or scratched surfaces with manufacturer's touch-up paint. Adjust and test each ventilator for proper operation.

END OF SECTION

SECTION 233726 - WALL LOUVERS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of wall louver work is indicated by drawings and schedules, and by the requirements of this section.

1.4 Refer to other Division-23 sections for ductwork, duct accessories and controls work.

1.5 AMCA Compliance: Test and rate louvers in accordance with AMCA Standard 500. Provide AMCA certified rating seal. Ratings based on tests and procedures performed in accordance with AMCA 500-L and complying with the AMCA 511 Certified Ratings Program. AMCA Certified Ratings Seal applies to air performance, water penetration and wind driven rain ratings.

1.6 Product Qualifications:

1. Miami-Dade County, Florida Notice of Acceptance (NOA).
2. Florida Building Code Approval.
3. Louver shall be certified to Florida Building Code Testing Application Standards TAS 100(A) (Wind Driven Rain Resistance), TAS 201 (Large Missile Impact), TAS 202 (Uniform Static Air Pressure) and TAS 203 (Cyclic Wind Loading).
4. AMCA Listed for compliance to AMCA 540 Level E and AMCA 550 standards.

1.7 Approval Submittals:

1.7.1 Product data: Submit manufacturer's technical product data for louvers including: model number, accessories furnished, construction, finish, mounting details, performance data.

1.8 O&M Data Submittals: Submit maintenance data, including cleaning of finishes and a copy of approval submittals. Include in O&M manual.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, submit products by Ruskin, Greenheck, Arrow, American Warming and Ventilating, or AMCA labeled approved equal.

2.2 General: Except as otherwise indicated, provide manufacturer's standard louvers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation. Provide Kynar 500 coated, corrosion resistant finish and 5 year warranty; color to be selected by the Owner.

2.3 Substrate Compatibility: Provide louvers with 9 inch frame, flange and sill extension piece that are compatible with adjacent substrate, and that are specifically manufactured to fit into construction openings with accurate fit and adequate support, for weatherproof installation. Refer to general construction drawings and specifications for types of substrate which will contain each type of louver.

2.4 Materials: Construct of aluminum extrusions, Alloy 6063-T6 0.081" thick for frame and 0.081" thick for front blades and 0.060" thick for back blades. Weld units or use stainless steel fasteners.

2.5 Sill Flashing: Formed aluminum, 0.080" thick, upturned sides to prevent water leakage.

2.6 Installation Angles: Material: 1.375 x 2.25 inch x 0.125 inch thick continuous aluminum angles around louver perimeter for installation in concrete, deep CMU, steel and wood substrate wall systems.

2.7 Installation Plates: Material: 0.250 inch (6.4 mm) thick continuous aluminum flat or zee plates for installation in thin CMU substrate wall systems.

2.8 Louver Screens: On inside face of exterior louvers, provide 1/2" square mesh anodized aluminum wire bird screens mounted in removable extruded aluminum frames.

2.9 Stationary Louvers: Hurricane and impact rated louvers, basis of design is Greenheck EHV-901D.

2.10 Performance Data:

1. Performance Ratings: AMCA licensed.
   a. Based on testing 48 inches x 48 inches size unit in accordance with AMCA 500-L.
2. Free Area: 42 percent, nominal.
3. Free Area Size: 6.66 square feet.
4. Maximum Recommended Air Flow through Free Area: 2,155 feet per minute.
5. Air Flow: 10,431 cubic feet per minute.
6. Maximum Pressure Drop (Intake): 0.60 inches w.g..
7. Water Penetration: Beginning point of water penetration of 0.01 ounce per ft^2 of free area shall be above 1,250 feet per minute free area velocity.
8. Wind Load Rating: Maximum wind load of ±150 PSF.
9. AMCA 500-L Wind Driven Rain Performance: 99.9 percent effective at preventing water penetration through louver when tested at 50 miles per hour wind with 8 inches per hour rainfall and 2,155 feet per minute airflow through the free area. Penetration Class 'A' with Discharge Class (Intake) '3' in accordance with AMCA 500-L Wind Driven Rain Test.

3 EXECUTION

3.1 Install where shown on the drawings in accordance with the manufacturer's printed instruction and Florida Product Approval. Exercise care to prevent scratches.

3.2 Isolate dissimilar metals per the manufacturer's recommendations.

3.3 Verify size of louvers shown on drawings prior to fabrication. Coordinate with wall openings. Sizes may be altered subject to approval by Engineer provided free area remains approximately the same as indicated.

END OF SECTION 233726

SECTION 26 05 00 - ELECTRICAL GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

The Electrical General Requirements are supplementing and applicable to Division 26 Sections and shall apply to all phases of work specified herein, shown on the Drawings, or required to provide a complete installation of electrical systems. Section 26 is sub-divided for convenience only.

A. This Section includes the following:

1. Job Conditions
2. Regulatory Requirements
3. Electrical equipment coordination and installation.
4. Submittals, Operating and Maintenance instructions and As-built drawings.
5. Common electrical installation requirements.
6. Warranty of work.

1.2 JOB CONDITIONS:

A. Site Inspections: Before submitting proposals, each bidder should visit the site and fully familiarize himself with all job conditions and shall be fully informed as to the extent of his work. No consideration will be given after bid opening date for alleged misunderstanding as to the requirements of work involved in connecting to the utilities or as to requirements of materials to be furnished. The contractor shall contact the utility prior to bid and make appropriate provisions in such bid as required by the utility for the utility's routing and connection.

B. Scheduled Interruptions: Planned interruptions of utilities service, to any facility affected by this contract, shall be carefully planned and approved by Architect at least ten (10) days in advance of the requested interruption. The Contractor shall not interrupt services until the Architect has granted specific approval. The request shall indicate services to be affected, date and time of interruption and duration of outage. Request for interruption of service will not be approved until all equipment and materials required for the completion of that particular phase of work are on the job site. The work may have to be scheduled after normal working hours.

C. Accidental Interruptions: All excavation and/or remodeling work required shall be performed with care so as not to interrupt other existing services (water, gas, electrical, sewer, sprinklers, etc.). If accidental utility interruption resulting from work performed by the Contractor occurs, service shall be immediately restored to its original condition without delay, by and at the expense of the Contractor, using skilled workmen of the trade required.

1.3 REGULATORY REQUIREMENTS:

A. Permits, Fees, and Inspections: This Contractor shall secure and pay for all permits, and inspections required on work performed under this section of the Specifications. He shall assume full responsibility for all assessments and taxes necessary for the completion and acceptance of the work.

B. Applicable Standards and Codes: The electrical installation shall comply with all applicable building codes; local, state, and federal ordinances; and the 2017 edition of the National Electrical Code. In

case of a discrepancy among these applicable regulatory codes and ordinances, the most stringent requirement shall govern. The Contractor shall notify the Architect in writing of any such discrepancy. Should the Contractor perform any work that does not comply with the applicable regulatory codes and ordinances he shall bear all cost arising in correcting the deficiencies. Application standards and codes shall include all local ordinances, all state laws, and the applicable requirements of the following:

1. American National Standards Institute - ANSI
2. National Electrical Manufacturer's Association - NEMA
3. National Fire Protection Association – NFPA (latest editions)
4. The Life Safety Code – NFPA 101, as adopted in Florida Building Code
5. The National Fire Alarm Code – NFPA 72, as adopted in Florida Building Code
6. Florida Building Code, latest Edition
7. Underwriters' Laboratories, Inc. – UL
8. National Electric Code 2017 – NFPA 70

C. Drawings and Specifications: The drawings and these specifications are complementary each to the other. What is called for by one shall be as binding as if called for by both. Omissions from the drawings and specifications of details of work which are evidently necessary to carry out the intent of the drawings and specifications, or which are customarily performed, shall not relieve the Contractor from performing such work. In any case of discrepancy in the figures or catalog numbers, the matter shall be submitted to the Architect, who shall promptly make a determination in writing. Any adjustment by the Contractor shall be at the Contractor's own risk and expense. Electrical drawings are diagrammatic only. Do not scale these drawings. All equipment shall be installed in accordance with manufacturer's recommendations and any conflicting data shall be verified before bidding.

D. The Contractor shall after completion of the work, furnish the Architect a certificate of final inspection and approval from the applicable local inspection department. Make necessary changes to plans and specifications to meet code standards at no additional cost to the Owner.

1.4 COOPERATION:

A. Interfacing with Other Crafts: It shall be the responsibility of the Contractor to cooperate and coordinate with all other crafts working on this project. This Contractor shall do all cutting, trenching, backfill and structural removals to permit entry of the electrical system components. The General Contractor shall do all patching and finishing.

B. Equipment Furnished Under Other Sections: This Contractor shall furnish and install, complete electrical roughing-in and connections to all equipment furnished under other sections and indicate on drawings. This includes all outlets as shown on mechanical, telecom, and electrical drawings. All such equipment shall be set in place as work of other sections.

C. HEATING AND AIR CONDITIONING:

1. The Contractor shall furnish all branch circuit wiring to motors and control panels or centers including disconnects, receptacles, switches, and appurtenances to which the system at the units may be connected, to provide a complete system of wiring for power. Control equipment and control circuit wiring is specified in the Mechanical Section.
2. Control devices to be included in the branch circuit, except those furnished integral with the equipment, will be delivered by the Heating and Air Conditioning Contractor and installed by the Electrical Contractor.

1.5 WORKMANSHIP: All work shall be executed in a neat and substantial manner by skilled workman, well qualified, and regularly engaged in the type of work required. Substandard work shall be removed and replaced by the Contractor at no cost to the Owner.

1.6 APPROVAL OF MATERIALS AND EQUIPMENT:

Prior-Submittals: The Contractor shall base his proposal on the materials specified herein and on the drawings. Reference to a particular product by manufacturer, trade name, or catalog number establishes the quality standards of material and equipment required for this installation and is not intended to exclude products equal in quality and similar design. The Specifying Engineer reserves the sole right to decide the equality of materials proposed for use in lieu of these specified. It shall be the Contractor's responsibility to furnish the information and data sufficient to establish the quality and utility of the items in question, including furnishing of samples if required. If other equipment manufacturers determine that their equipment will fit in the space and meet the recommended clearances, suit all job conditions, equal or exceed the quality of the specified items, then a request may be made in writing to the Specifying Engineer at least ten (10) business days prior to bid date for permission to be included in the approved equipment list. All data required for evaluation shall accompany the above letter. The Specifying Engineer offers two submittal reviews, if these are unacceptable, only an “as-specified” submittal will be accepted. In addition, all value engineering alternates should only be submitted when directly requested by the owner and must be noted specifically as “VE” alternates to the items specified in the construction documents. A letter from the owner directing the VE effort is strongly encouraged as an accompaniment to any VE submittal.

A. Submittals:

1. Submittals: The Contractor shall submit a list of equipment proposed for installation. Catalog data and shop drawings on all proposed systems and their components shall be submitted. Where substitutions alter the design or space requirements, the Contractor shall defray all items of cost for the revised design and construction including costs to all allied trades involved. Provide six (6) copies of submittals and shop drawings as a minimum unless the General Conditions requires a greater number of copies. In lieu of paper copies, the Contractor may submit the submittals in PDF format.
   a. Submittals Schedule: Submittals shall be submitted within thirty (30) days after the contract is awarded. It is not the responsibility of the Engineer to expedite the review of submittals if the contractor has not adequately prepared the submittals in a time efficient manner. The contractor bears all the responsibility for the added time requirements of resubmittals.
   b. Identification: Place a permanent label or title block on each submittal for identification. Each major section of submittals such as power equipment, lighting equipment, fire alarm, etc., shall be secured together in a booklet or stapled with a covering index. The different parts of the submittal shall describe which Specification Section it is referenced. The covering index shall list the following information:
      1) Project name and date
      2) Name, address, and phone number of General contractor and project manager.
      3) Name, address, and phone number of Sub-contractor and project manager.
      4) Supplier of equipment with phone number and person responsible for this project.
      5) Index of each item covered in submittal and model number.
      6) Any deviation from contract documents shall be specifically noted on submittal cover index and specifically identified with highlighting, encircling, or boldly on specific submittal sheet.

c. The submittal shall not be in individual parts per each Specification Section but be combined as a part of a major section such as power equipment, lighting equipment, fire alarm, methods, etc.

d. Resubmittals: The Specifying Engineer will participate in two resubmittal reviews. After the second resubmittal review, the Engineer shall not review the submittal until the Contractor provides $1,000 to the Engineer to perform each additional required resubmittal review. Make resubmittals in same form and number of copies as initial submittal.
   1) Include previous submittal review comments.
   2) For each item being resubmitted, include previous review comment and explain how resubmitted item meets the criteria of the previous review comment.

2. Electrical and Mechanical/Plumbing/Fire Protection Equipment Coordination's:

The electrical power equipment submittals shall be accompanied by a letter verifying coordination of electrical services for all mechanical, plumbing, and fire protection equipment requiring power. The letter shall follow the format listed below.

To: _____
(General Contractor)

Re: _____
(Project name and location)

We the undersigned subcontractors certify that we have coordinated the electrical requirements for mechanical, plumbing, and fire protection sprinkler equipment as evidenced by the coordination chart listed herein.

Item	Load Full Load Amps	1 Phase or 3 Phase	Number of Electrical Connections	Maximum Overcurrent Protection	Minimum Overcurrent Protection	Breaker Proposed	Circuit Proposed

The above list details all required electrical connections for mechanical equipment.

Signed: _____

For: _____
Mechanical Subcontractor

The above list details all required electrical connections for plumbing equipment.

Signed: _____

For: _____

Plumbing Subcontractor

The above list details all required electrical and fire alarm connections for fire protection equipment.

Signed: _____

For: _____
Fire Protection Sprinkler Subcontractor

The above list of equipment has been reviewed and the required connections are being provided. (Any exceptions or request for direction shall be listed here)

Signed: _____

For: _____
Electrical Subcontractor

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protection: Take necessary precautions to protect all material, equipment, apparatus and work from damage. Failure to do so to the satisfaction of the Architect will be sufficient cause for the rejection of the material, equipment or work in question. Contractor is responsible for the safety and good condition of the materials installed until final acceptance by the owner.

B. Cleaning: Conduit openings shall be capped or plugged during installation. Fixtures and equipment shall be tightly covered and protected against dirt, moisture, chemical and mechanical injury. At the completion of the work the fixtures, material and equipment shall be thoroughly cleaned and delivered in condition satisfactory to the Architect.

1.8 Testing and Balancing: Make tests that may be required by the Owner or the Architect in connection with the operation of the electrical system in the buildings. Balance all single-phase loads connected to all panelboards in the buildings to insure approximate equal divisions of these loads on the main secondary power supply serving the buildings. All tests shall be made in accordance with the latest standards of the IEEE and the NEC. The installation shall be tested for performance, grounds and insulation resistance. A "megger" type instrument shall be used. Contractor shall perform circuit continuity and operational tests on all equipment furnished or connected by Contractor. The tests shall be made in the presence of the Architect or his representative. The Contractor shall notify the Architect at least twenty-four (24) hours in advance of tests. The Contractor shall provide all testing equipment and all costs shall be borne by him. Written reports shall be made of all tests. All faults shall be corrected immediately.

A. A letter shall be written giving the following:
   1. Measured amps on each phase of each panel.
   2. Resistance to ground of each new grounding electrode.
   3. Measured voltage phase to phase and phase to neutral at each panel.
   4. Ground continuity and polarity instrument used.

1.9 OPERATING AND MAINTENANCE INSTRUCTIONS/AS BUILT DRAWINGS:

A. Four (4) complete sets of instructions containing the manufacturer's operating and maintenance instructions for each piece of equipment shall be furnished to the Owner. Each set shall be permanently bound and shall have a hard cover. One complete set shall be furnished at the time

that the test procedure is submitted, and remaining sets shall be furnished before the Contract is completed. Flysheets shall be placed before instructions covering each subject. The instruction sheets shall be approximately 8-1/2" by 11" with large sheets of Drawings folded in. The instructions shall include information for major pieces of equipment and systems.

B. Upon completion of the work and at the time designated, the services of one project engineer shall be provided by the Contractor to instruct the representative of the Owner in the operation and maintenance of the systems.

C. This Contractor shall provide as-built Drawings at the completion of the job. Drawings shall show all significant changes in equipment, wiring, routing, location, etc. All underground conduit routing shall be accurately indicated with locations dimensioned. As-built drawings shall be submitted for review as red-lined on a field hard copy. After review by the Architect, the Contractor will be given digital AutoCAD files and shall make revisions and resubmit final on disk.

1.10 GUARANTEE AND SERVICE: Upon completion of all tests and acceptance, the Contractor shall furnish the Owner a written guarantee covering the electrical work done for a period of one (1) year from date of acceptance. Guarantee includes equipment capacity and performance ratings specified without excessive noise levels. Upon notice from the Architect or the Owner, the Contractor shall, during the guarantee period, rectify and replace any defective material or workmanship and repair any damage caused thereby without additional cost.

PART 2 PRODUCTS

PART 3 EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to raceways and piping systems installed at a required slope.

END OF SECTION

SECTION 26 05 10 – ELECTRICAL METHODS AND BASIC MATERIALS

PART 1 GENERAL

1.1 SECTION INCLUDES:

A. Supports
B. Excavation, Trenching, and Backfilling
C. Cutting and Patching
D. Equipment Connection
E. Identification of Equipment
F. Cleaning and Painting

PART 2 PRODUCTS

2.1 SUPPORTS:

A. Framing Steel: Galvanized or painted rolled steel of standard shapes and sizes.
B. Manufactured Channel: Hot dipped galvanized with all hardware required for mounting as manufactured by Unistrut, Steel City, or approved equal.
C. Miscellaneous Hardware: Standard sizes treated for corrosion resistance.

2.2 IDENTIFICATION:

A. Nameplates: Laminated black micarta with ¼" high engraved white letters.
B. Panel Directories: Typewritten under plastic cover.
C. Wire and Cable Markers: Cloth, split sleeve, or tubing type.

PART 3 EXECUTION

3.1 INSTALLATION

A. Products shall be installed in accordance with manufacturer's instructions.
B. Install support systems sized and fastened to accommodate weight of equipment and conduit, including wiring, which they carry.
   1. Fasten hanger rods, conduit clamps, and outlet junction boxes to building structure using pre-cast insert system, expansion anchors, preset inserts, beam clamps, or spring steel clips.
   2. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion and anchors on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.
   3. Do not fasten supports to piping, ceiling support wires, ductwork, mechanical equipment, or conduit.
   4. Do not use powder-actuated anchors.
   5. Do not drill structural steel members without written consent from the Architect.
   6. Fabricate supports from structural steel or steel channel.
   7. Install surface mounted cabinets and panel boards with minimum of four anchors.
   8. Provide steel channel supports to stand cabinets one inch off wall in wet locations.
   9. Bridge studs top and bottom with channels to support flush mounted cabinets and panel boards in stud walls.

C. Excavating, trenching, and backfilling shall be accomplished as indicated on the Drawings or where required to install systems and/or equipment.

1. Trenches for all underground conduits or equipment shall be excavated to the required depths. Where soft, wet, or unstable soil is encountered, the bottom of the trench shall be filled with 6 inches of compacted gravel and sand fill. All trench bottoms shall be tamped hard. Trenches shall be shored as required to meet OSHA requirements and general safe working conditions.
2. After conduits or equipment have been inspected and approved by the Architect and prior to backfilling, all forms shall be removed, and the excavation shall be cleaned of all trash and debris. Material for backfilling shall consist of the excavation, or borrow of sand, gravel, or other materials approved by the Architect and shall be free of trash, lumber or other debris. Backfill shall be placed in horizontal layers, not exceeding 9 inches in depth and properly moistened to approximate optimum requirements. Each layer shall be compacted by hand, or machine tamped to a density equivalent to surrounding soil. Backfill shall be brought to suitable elevation above ground to provide for anticipated settlement and shrinkage. All paving broken up shall be repaired and returned to the original condition.
3. All exterior underground conduits shall have an underground (metal foil) tape installed 12 inches above conduit identified as ELECTRICAL to aid in future location of conduit.
4. All underground conduits shall have an underground red tape installed 12” above conduit.

D. Cutting and Patching: This Contractor shall provide all cutting, digging, etc., incident to his work and shall make all required repairs thereafter to the satisfaction of the Architect, but in no case shall the Contractor cut into any major structural element, beam, or column without written approval of the Architect.

1. Pavements, sidewalks, roads, curbs, walls, ceilings, floors, and roofs shall be sawcut, patched, repaired and/or replaced as required to permit the installation of the electrical work. Existing concrete floors and other slabs, which require vertical piercing for installation of conduit raceways shall be neatly core drilled. The Contractor shall carefully lay out his drilling in advance and arrange it to minimize exposed work.
2. The Contractor shall bear the expense of all cutting, patching, painting, repairing, or replacing of the work of other trades required because of his fault, error, or tardiness or because of any damage done by him.
3. All patching, and finishing shall be performed by the General Contractor.

E. Make electrical connections to equipment in accordance with equipment manufacturer’s instructions.

1. Verify that wiring and outlet rough-in work is complete and that equipment is ready for electrical connection, wiring, and energization.
2. Make wiring connections in control panel or in wiring compartment of pre-wired equipment. Provide interconnecting wiring where indicated.
3. Install and connect disconnect switches, controllers, control stations, and control devices as indicated.
4. Make conduit connections to equipment using flexible conduit. Use liquid-tight flexible conduit in damp or wet locations.
5. Install pre-fabricated cord set where connections with attachment plug is indicated or specified, or use attachment plug with suitable strain-relief clamps.
6. Provide suitable strain-relief clamps for cord connections to outlet boxes and equipment connection boxes.

F. Identify electrical distribution and control equipment, and loads served, to meet regulatory requirements and as specified herein.

1. Degrease and clean surface to receive nameplates.

2. Secure nameplates to equipment fronts using screws or rivets with edges parallel to equipment lines.
3. Each new panel shall have an external nameplate. Disconnect switches, starters or similar devices shall have a micarta engraved nameplate mechanically affixed indicating the load served and the location, such as “A/C 2” or “A/C 3 above ceiling”. Letters shall be ¼” white on a black background. Panels shall be designated in this manner:

   “Panel A
   120/208 Volts
   3 Phase 4 Wire
   Served from Panel MP”

4. Panel directories shall accurately indicate load served and location of load.
5. Engrave plates as indicated on the Drawings.

G. Raceway junction boxes for each system shall be identified by painting the inside of the junction box cover for exposed work and both sides of the covers for concealed work according to the following code:

Receptacle Circuits	Black
120 V. Lighting Circuits	White
208 V. Power & Misc.	Green
277/480 V. Power & Misc.	Yellow
Fire Alarm System	Red

If the established color code at this site conflicts with the above, the contractor shall so state in a letter outlining his proposed colors to maintain conformity

H. Install wire markers on each conductor in panel board gutters, boxes, and at load connections.

1. Use distribution panel and branch circuit or feeder number to identify power and lighting circuits.
2. Use control wire number as indicated on schematic and interconnection diagrams or equipment manufacturer’s shop drawings to identify control wiring.

I. Cleaning and Painting: The respective Contractors for the various phases of work shall clear away all debris, surplus materials, etc., resulting form their work or operations, leaving the job and equipment furnished in the clean first-class condition.

1. All fixtures and equipment shall be thoroughly cleaned of plaster, stickers, rust, stains and other foreign matter or discoloration, leaving every part in an acceptable condition ready for use.
2. The Contractor shall refinish and restore to the original condition and appearance, all electrical equipment, which has sustained damage to manufacturer’s prime and finish coats or enamel or paint. Materials and workmanship shall be equal to the requirements described for other painting.

END OF SECTION

SECTION 26 05 19 – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS OR LESS)

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.2 SUBMITTALS

A. Field quality-control test reports.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

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:

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.

2.2 CONDUCTORS AND CABLES

A. Manufacturers:
1. American Insulated Wire Corp.; a Leviton Company.
2. General Cable Corporation.
3. Senator Wire & Cable Company.
4. Southwire Company.
5. Okonite

B. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.

C. Conductor Material: Copper. Solid conductor for No. 10 AWG and smaller, stranded for No. 8 AWG and larger. Aluminum conductors using compact sector stranding will be permitted for circuits 100 amps and above. Contractor shall upsize conductor and conduits for aluminum equivalents and submit for approval.

D. Conductor Insulation Types: THHN-THWN and SO.

2.3 CONNECTORS AND SPLICES

A. Manufacturers: AFC Cable Systems, Inc.

1. AMP Incorporated/Tyco International.
2. Hubbell/Anderson.
3. O-Z/Gedney; EGS Electrical Group LLC.
4. 3M Company; Electrical Products Division.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

C. Connections from boxes to lay-in fixtures in grid ceiling may be made with MC (metal clad) cable cut to minimum length.

PART 3 - EXECUTION

3.1 CONDUCTOR AND INSULATION APPLICATIONS

A. Service Entrance: Type THHN-THWN, single conductors in raceway.

B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspaces: Type THHN-THWN, single conductors in raceway.

E. Exposed Branch Circuits, including in Crawlspaces: Type THHN-THWN, single conductors in raceway.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

G. Branch Circuits Concealed in Concrete and below Slabs-on-Grade: Type THHN-THWN, single conductors in raceway.

H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord.

I. Fire Alarm Circuits: Type THHN-THWN, in raceway.

J. Class 1 Control Circuits: Type THHN-THWN, in raceway.

K. Class 2 Control Circuits: Power-limited cable, concealed in building finishes.

3.2 INSTALLATION

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. 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.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

E. Support cables according to Division 26 Section "Raceways and Boxes for Electrical Systems."

F. Seal around cables penetrating fire-rated elements according to Division 26 Section "Firestop Systems and Sleeves."

G. Identify and color-code conductors and cables according to Division 26 Section “Identification for Electrical Systems.”

H. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.

I. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.3 FIELD QUALITY CONTROL

A. Testing: Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.

B. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION

SECTION 26 05 23 – FIRESTOP SYSTEMS AND SLEEVES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Through penetration firestop systems.
2. Sleeves for raceways and cables.
3. Sleeve seals.

1.2 PERFORMANCE REQUIREMENTS

A. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per UL 1479:

1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
   a. Penetrations located outside wall cavities.
   b. Penetrations located outside fire-resistance-rated shaft enclosures.
3. L-Rated Systems: Where through-penetration firestop systems are indicated in smoke barriers, provide through-penetration firestop systems with L-ratings of not more than 3.0 cfm/sq. ft (0.01524cu. m/s x sq. m) at both ambient temperatures and 400 deg F (204 deg C).

B. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.

C. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."

B. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.

C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:

1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems bearing classification marking of qualified testing and inspecting agency.

D. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

E. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application that are produced by one of the following manufacturers:

1. A/D Fire Protection Systems Inc.
2. Hilti, Inc.
3. Nelson Firestop Products.
4. NUCO Inc.
5. RectorSeal Corporation (The).
6. Specified Technologies Inc.
7. 3M; Fire Protection Products Division.
8. Tremco; Sealant/Weatherproofing Division.

2.2 FIRESTOPPING

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.

2.3 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

C. Coordinate sleeve selection and application with selection and application of firestopping.

2.4 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
2. Pressure Plates: Plastic. Include two for each sealing element.
3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

PART 3 - EXECUTION

3.1 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing 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 firestop systems.

C. Install fill materials for firestop systems 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 Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

D. Identification: Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating

items or firestop systems. Use mechanical fasteners for metal labels. Include the following information on labels:

1. The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Through-penetration firestop system designation of applicable testing and inspecting agency.
4. Date of installation.
5. Through-penetration firestop system manufacturer's name.
6. Installer's name.

3.2 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage an independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.

B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

3.3 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Coordinate sleeve selection and application with selection and application of firestopping.

C. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

E. Cut sleeves to length for mounting flush with both surfaces of walls.

F. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.

G. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.

H. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.

I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.

J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials.

K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

M. Underground, Exterior-Wall Penetrations: Install "wall pipes" for sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

END OF SECTION

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes methods and materials for grounding systems and equipment.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field quality-control test reports.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 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 (6 mm) 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 (41 mm) wide and 1/16 inch (1.6 mm) thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.2 CONNECTORS

A. Listed and labeled by a nationally recognized testing laboratory 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, bolted pressure-type, with at least two bolts.

1. Pipe Connectors: Clamp type, sized for pipe.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel, sectional type; 3/4 inch in diameter by 20 feet long (19 mm by 3 m).

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.

B. Underground Grounding Conductors: Install insulated copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches (600 mm) below grade.

C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.

D. 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 EQUIPMENT GROUNDING

A. 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.
7. Computer and Rack-Mounted Electronic Equipment Circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.

B. 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.

C. Water Heater and Heat-Tracing 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.

D. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.

E. Signal and Communication Equipment: For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.

1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch (6-by-50-by-300-mm) grounding bus.
2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

F. Metal 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.

3.3 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 Rods: Drive rods until tops are 2 inches (50 mm) 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 two 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.

C. 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 so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.

D. Grounding and Bonding for Piping: Provide grounding for all new metal pipes.

E. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:

1. After installing new grounding electrode systems but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells.
   a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
   b. Perform tests by fall-of-potential method according to IEEE 81.

B. Report measured ground resistances that exceed 5 ohms.

END OF SECTION

SECTION 26 05 29 - ELECTRICAL SUPPORTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.2 SUBMITTALS

A. Product Data: Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of support component used.

B. Shop Drawings for Supports: For supports and their attachments to structure not defined on Drawings, identify hardware, and indicate analysis, forces, strengths, materials, and dimensions, signed and sealed by a qualified professional engineer.

1.3 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

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. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed under this Project, with a minimum structural safety factor of five the applied force.

B. Steel Slotted Support Systems: Comply with MFMA-3, factory-fabricated components for field assembly, and provide finish suitable for the environment in which installed.

1. Available Manufacturers:
   a. Cooper B-Line; a division of Cooper Industries.
   b. ERICO International Corporation.
   c. Allied Support Systems; Power-Strut Unit.
   d. GS Metals Corp.
   e. Michigan Hanger Co., Inc.; O-Strut Div.
   f. National Pipe Hanger Corp.
   g. Thomas & Betts Corporation.
   h. Unistrut; Tyco International, Ltd.
   i. Wesanco, Inc.
2. Channel Dimensions: Selected for structural loading.

C. Raceway and Cable Supports: As described in NECA 1.

D. 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.

E. 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.

F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
   a. Available Manufacturers:
      1) Cooper B-Line; a division of Cooper Industries.
      2) Empire Tool and Manufacturing Co., Inc.
      3) Hilti, Inc.
      4) ITW Construction Products.
      5) MKT Fastening, LLC.
      6) Powers Fasteners.
2. Concrete Inserts: Steel or malleable-iron slotted-support-system units similar to MSS Type 18; complying with MFMA-3 or MSS SP-58.
3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
4. Through Bolts: Structural type, hex head, high strength. Comply with ASTM A 325.
5. Toggle Bolts: All-steel springhead type.
6. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 for application of hangers and supports for electrical equipment and systems, unless requirements in this Section or applicable Code are stricter.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 for installation requirements, except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, 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 (90 kg).

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. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
6. To Light Steel: Sheet metal screws.
7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount on slotted-channel racks attached to substrate.

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. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

B. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions.

B. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so expansion anchors will be a minimum of 10 bolt diameters from edge of the base.

1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around full perimeter of the base.
2. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
3. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.
5. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
6. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete.

3.5 INSTALLATION OF SEISMIC-RESTRAINT COMPONENTS

A. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.

B. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

C. Restraint Cables: Provide slack within maximums recommended by manufacturer.

D. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, upper truss chords of bar joists, or at concrete members.

3.6 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Make flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross expansion joints, where adjacent sections or branches are supported by different structural elements, and where they terminate with connection to electrical equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

END OF SECTION

SECTION 26 05 33 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

B. See Division 26 Section "Firestops System and Sleeves" for firestopping materials and installation at penetrations through walls, ceilings, and other fire-rated elements.

C. See Division 26 Section "Electric Methods and Basic Materials" for supports, anchors, and identification products.

D. See Division 26 Section "Wiring Devices" for devices installed in boxes and for floor-box service fittings.

1.2 SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets indicated.

B. Shop Drawings: Show fabrication and installation details of components for raceways, fittings, boxes, enclosures, and cabinets.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

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:

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.

2.2 METAL CONDUIT AND TUBING

A. Manufacturers:

1. AFC Cable Systems, Inc.
2. Alflex Inc.
3. Anamet Electrical, Inc.; Anaconda Metal Hose.
4. Electri-Flex Co.
5. Grinnell Co./Tyco International; Allied Tube and Conduit Div.
6. LTV Steel Tubular Products Company.
7. Manhattan/CDT/Cole-Flex.
8. O-Z Gedney; Unit of General Signal.
9. Wheatland Tube Co.

B. Rigid Steel Conduit: ANSI C80.1.

C. EMT and Fittings: ANSI C80.3.

1. Fittings: Steel, Set-screw or compression type. No die-cast.

D. LFMC: Flexible steel conduit with PVC jacket.

E. Fittings: NEMA FB 1; compatible with conduit and tubing materials.

2.3 NONMETALLIC CONDUIT AND TUBING

A. Manufacturers:

1. American International.
2. Anamet Electrical, Inc.; Anaconda Metal Hose.
3. Arnco Corp.
4. Cantex Inc.
5. Certainteed Corp.; Pipe & Plastics Group.
6. Condux International.
7. ElecSYS, Inc.
8. Electri-Flex Co.
9. Lamson & Sessions; Carlon Electrical Products.
10. Manhattan/CDT/Cole-Flex.
11. RACO; Division of Hubbell, Inc.
12. Spiralduct, Inc./AFC Cable Systems, Inc.
13. Thomas & Betts Corporation.

B. RNC: NEMA TC 2, Schedule 40 and Schedule 80 PVC.

C. RNC Fittings: NEMA TC 3; match to conduit or tubing type and material.

2.4 METAL WIREWAYS

A. Manufacturers:

1. Hoffman.

2. Square D.

B. Material and Construction: Sheet metal sized and shaped as indicated.

C. Fittings and Accessories: Include 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.

D. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.

E. Wireway Covers: Screw-cover type.

F. Finish: Manufacturer's standard enamel finish.

2.5 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers:

1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
2. Emerson/General Signal; Appleton Electric Company.
3. Erickson Electrical Equipment Co.
4. Hoffman.
5. Hubbell, Inc.; Killark Electric Manufacturing Co.
6. O-Z/Gedney; Unit of General Signal.
7. RACO; Division of Hubbell, Inc.
8. Thomas & Betts Corporation.
9. Walker Systems, Inc.; Wiremold Company (The).

B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.

D. Nonmetallic Outlet and Device Boxes: NEMA OS 2.

E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

F. Cast-Metal Pull and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.

G. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.

H. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage and include accessory feet where required for freestanding equipment.

2.6 FACTORY FINISHES

A. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard paint applied to factory-assembled surface raceways, enclosures, and cabinets before shipping.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors:

1. Exposed: Rigid steel.
2. Concealed: Rigid steel.
3. Underground, Single Run: SCH 40 PVC.
4. Underground, Grouped: SCH 40 PVC.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
6. Boxes and Enclosures: NEMA 250, Type 3R.

B. Indoors:

1. Exposed: EMT in unfinished areas where shown or permitted.
2. Concealed: EMT.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except use LFMC in damp or wet locations or where exposed to view (not concealed).
4. Damp or Wet Locations: Rigid steel conduit.
5. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
   a. Damp or Wet Locations: NEMA 250, Type 4, nonmetallic.
6. Flexible metal conduit: Where applications are not concealed by the building construction, liquid tight flexible conduit and grounding type fittings shall be used and system shall be fully bonded.

C. Minimum Raceway Size: 1/2-inch trade size (DN 16), except underground shall be ¾" minimum.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

3.2 INSTALLATION

A. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

B. Complete raceway installation before starting conductor installation.

C. Support raceways as required by NEC.

D. Install temporary closures to prevent foreign matter from entering raceways.

E. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above finished slab.

F. Make bends and offsets so ID is not reduced. Keep legs of bends in same plane and keep straight legs of offsets parallel, unless otherwise indicated.

G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.

1. Install concealed raceways with a minimum of bends in shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.

H. Raceways Embedded in Slabs: Install in middle 1/3 of slab thickness where practical and leave at least 2 inches (50 mm) of concrete cover.

1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
2. Space raceways laterally to prevent voids in concrete.
3. Run conduit larger than 1-inch trade size (DN 27) parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
4. Change from nonmetallic tubing to Schedule 80 nonmetallic conduit, rigid steel conduit, or IMC before rising above floor, except PVC branch circuits may rise concealed in walls to first box maximum 48” AFF.

I. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.

1. Run parallel or banked raceways together on common supports.
2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.

J. Join raceways with fittings designed and approved for that purpose and make joints tight.

1. Use insulating bushings to protect conductors.

K. Tighten set screws of threadless fittings with suitable tools.

L. Terminations:

1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.

M. Install pull cords in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull cord.

N. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with UL-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. Install raceway sealing fittings at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where otherwise required by NFPA 70.

O. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches (150 mm) above the floor. Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.

P. Flexible Connections: Use maximum of 72 inches (1830 mm) of flexible conduit for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations or where exposed to view (not concealed). Install separate ground conductor across flexible connections.

Q. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.

R. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

3.3 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 26 05 53 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Identification for conductors and communication and control cable.
2. Warning labels and signs.
3. Equipment identification labels.

1.2 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

1.4 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

PART 2 - PRODUCTS

2.1 CONDUCTOR AND COMMUNICATION- AND CONTROL-CABLE IDENTIFICATION MATERIALS

A. Marker Tape: Vinyl or vinyl -cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.2 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.

C. Baked-Enamel Warning Signs: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 7 by 10 inches (180 by 250 mm).

D. Fasteners for Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

E. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 mm)."

2.3 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and ultraviolet-resistant seal for label.

B. 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 (10 mm).

PART 3 - EXECUTION

3.1 APPLICATION

A. Auxiliary Electrical Systems Conductor and Cable Identification: Use marker tape to identify field-installed alarm, control, signal, sound, intercommunications, voice, and data wiring connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and cable pull points. Identify by system and circuit designation.
2. Use system of designations that is uniform and consistent with system used by manufacturer for factory-installed connections.

B. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Comply with 29 CFR 1910.145 and apply baked-enamel warning signs. Identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.

1. 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.

2. Equipment Requiring Workspace Clearance According to NFPA 70: Unless otherwise indicated, apply to door or cover of equipment but not on flush panelboards and similar equipment in finished spaces.

C. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and 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- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where 2 lines of text are required, use labels 2 inches (50 mm) high.
   b. Outdoor Equipment: Engraved, laminated acrylic or melamine label, drilled for screw attachment.
   c. Elevated Components: Increase sizes of labels and legend to those appropriate for viewing from the floor.
2. Equipment to Be Labeled:
   a. Panelboards, electrical cabinets, and enclosures.
   b. Electrical switchgear and switchboards.
   c. Disconnect switches.
   d. Enclosed circuit breakers.
   e. Motor starters.
   f. Push-button stations.
   g. Power transfer equipment.
   h. Contactors.
   i. Receptacles: Provide panel and circuit designation.

3.2 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach nonadhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

F. Color-Coding for Phase and Voltage Level Identification, 600 V and Less: Use the colors listed below for ungrounded service, feeder, and branch-circuit conductors.

1. Color shall be factory applied.
2. Colors for 208/120-V Circuits: (unless existing color code is different)
   a. Phase A: Black.
   b. Phase B: Red.
   c. Phase C: Blue.
   d. Neutral: White.
3. Colors for 480/277V circuits: (unless existing color code is different)
   a. Phase A: Orange
   b. Phase B: Yellow
   c. Phase C: Brown
   d. Neutral: Gray

END OF SECTION

SECTION 26 06 00- SERVICE AND DISTRIBUTION

PART 1 - GENERAL

1.1 SECTION INCLUDES:

A. Grounding and bonding

B. Service entrance

C. Utility requirements

D. Panelboards

E. Enclosed switches

F. Fuses

G. Contactors

1.2 SERVICE TYPE DESCRIPTION: Electric Service System shall be 480/277 volts 3 phase 4 wire served from an existing service.

1.3 PROJECT CONDITIONS: Verify field measurements for the equipment to ensure proper fit within the space provided.

1.4 UTILITY REQUIREMENTS:

A. The serving utility is Gulf Power Company (GPC).

1. The Owner will pay directly to the Utility for all assessments, service charges, fees, etc. from the utility for service requirements.
2. The Owner will provide required easements to the electric Utility.

1.5 EQUIPMENT APPLICATION: All equipment and materials shall have ratings established by a recognized independent agency or laboratory. The Contractor shall apply the items used on this project within those ratings and application shall be subject to any stipulations or exceptions established by the independent agency or laboratory. Use of equipment or materials in applications beyond that certified by the agency or beyond that recommended by the manufacturer shall be cause for removal and replacement of such misapplied items

PART 2 - PRODUCTS

2.1 GROUNDING MATERIALS:

A. Ground rod: 16 feet x ¾" diameter, copper clad steel, sectional driven.

B. Ground connectors: Approved ground clamp manufactured of cast bronze construction with matching bolts, nuts, and washers.

C. Exothermic welds: Materials shall be from the same source. Welding process shall be Cadweld or approved equal.

D. Grounding conductors: Green colored and coded insulated copper (#12 AWG minimum) or bare soft drawn copper as indicated on Drawings.

2.2 SWITCHBOARD:

A. Switchboard: NEMA PB2.

1. Line and Load Terminations: Accessible from the front only of switchboard, suitable for conductor materials used.
2. Main Sections Devices: Individually mounted.
3. Distribution Section Devices: Panel mounted.

B. Bussing:

1. Bus Material: Plated Copper or Plated Aluminum sized in accordance with NEMA PB2.
2. Bus Connections: Accessible from front for maintenance.
3. Ground Bus: Plated Copper or Plated Aluminum.

C. Enclosure: Type 1 General Purpose as shown on the Drawings.

1. Align sections at rear.
2. Finish: Manufacturer's standard light gray enamel over external surfaces.

D. Future provisions:

1. Fully equip spaces for future devices with bussing and bus connection provisions; continuous current rating as indicated on the Drawings.
2. Do not taper main bus rating.

E. Switching and over-current protection devices:

1. Molded Case Circuit Breakers: NEMA AB 1.
2. Solid State Molded Case Circuit Breakers: NEMA AB 1; with electronic sensing, timing and tripping circuits for adjustable trip settings; ground fault trip; instantaneous trip and adjustable short time trip.

F. Switchboard instruments:

1. Advanced electrical meter: Mount in face of switchboard with electronic retrieval of real time reading and maximum monthly readings.

G. Manufacturers:

1. Eaton or Cutler Hammer – Powerline C Switchboard or approved equal by Siemens, GE or Square D Company.

H. Engraved micarta nameplates: shall be provided for each branch.

2.3 PANELBOARDS:

A. Distribution panelboards: NEMA PB 1; circuit breaker type.

1. Bus Material: Plated Copper or Plated Aluminum.
2. Ground Bus: Plated Copper or Plated Aluminum.
3. Enclosures: Type 1 or 3R as shown on the Drawings.
4. Mounting: Surface or flush mount as indicated on the Drawings.
5. Door: Hinged with lock. Door assembly shall be hinged to enclosure for panels rated 250 amps or larger.
6. Circuit Breakers: Bolt-on, ratings as shown on Drawings.
7. Distribution Panelboards: without doors shall have engraved micarta nameplates for each breaker.

B. Light and power panelboards: NEMA PB 1; circuit breaker type.

1. Bus Material: Plated Copper or Plated Aluminum.
2. Ground Bus: Plated Copper or Plated Aluminum.
3. Enclosures: Type 1 or 3R as shown on the Drawings.
4. Mounting: Surface or flush mount as indicated on the Drawings.
5. Door: Hinged with lock.
6. Circuit Breakers: Bolt-on, ratings as shown on Drawings.

C. Accessories: Provide panel and branch device accessories as indicated on the Drawings

D. Future provisions: Where space provisions are indicated on the Drawings, provide bussing, bus extensions, etc. required to mount future circuit breakers. Where spare provisions are indicated on the Drawings, provide circuit breakers complete and ready for connection.

E. Manufacturers:

1. Eaton or Cutler Hammer – Powerline C Switchboard or approved equal by Siemens, GE or Square D. Company.

2.4 FUSES:

A. Service Entrance/Feeder Circuits – 600 Amp and smaller.

1. U.L. Class RK1
2. Current Limiting
3. 200,000-amp RMS Interrupt Rating
4. Voltage Rating: As required for system compatibility

B. Motor, Motor Controller, Transformer and Inductive Circuits.

1. U.L. Class RD1, Time Delay
2. Current Limiting
3. 200,000-amp RMS Interrupt Rating
4. Voltage Rating: As required for system compatibility

C. Manufacturers:

1. Square D Company
2. Siemens
3. Cutler – Hammer
4. General Electric

2.5 ENCLOSED CIRCUIT BREAKERS:

A. Circuit breaker: NEMA AB 1; Voltage and Accessories as indicated on Drawings.

B. Enclosures: Code gauge steel, NEMA 1 or 3R as required.

C. Manufacturers:

1. Square D Company
2. Siemens
3. Cutler – Hammer
4. General Electric

2.6 CONTACTORS:

A. Mechanically held contactors: NEMA ICS 2; mechanically held, electrically operated.

B. Electrically held contactors: NEMA ICS 2; electrically held, electrically operated.

C. Coil operating voltage: 120 volts, 60 Hz.

D. Enclosures: NEMA ICS 6; Type 1 or 3R as required.

PART 3 – EXECUTION

3.1 EXAMINATION AND PREPARATION:

A. Make arrangements with utility company to obtain permanent electrical service to the facility. Provide CT Cabinet and Meter base as required by utility for service connection.

3.2 INSTALLATION:

A. Install utility services in accordance with utility company standards and requirements.

1. Underground Service: Install service entrance conduits and conductors from the utility service point to the service equipment as shown on the Drawings.
2. Provide lugs on utility transformer spaces sized to accommodate service entrance conductors.

B. Install equipment in accordance with manufacturer's instructions.

C. Except where specifically indicated otherwise, all exposed non-current-carrying metallic parts of electrical equipment, metallic raceway systems, and service neutral of the electrical system shall be grounded.

1. Equipment grounding shall be accomplished by installing a separate grounding conductor in each raceway of the system. The Conductor shall be provided with a distinctive green insulation or marker and shall be sized in accordance with Article 250 of the National Electrical Code.
2. The electrical system grounding electrode connection shall be made at the main service equipment and shall be extended to the point of entrance of the metallic cold water service. A suitable ground clamp shall make connection to the water pipe. If flanged pipes are encountered, connection shall be made on the street side of the flange

connection. If the metallic water service is coated with an insulating material or there is no metallic water service to the building, ground connection shall be made to additional ground rods as required by resistance tests, at the exterior of the building driven full length into the earth.

3. The maximum resistance of the driven ground shall be tested with a ground resistance Megger and shall not exceed 25 ohms under normally dry conditions. If this cannot be obtained with a single rod, additional or parallel rods shall be installed 7'-6" on center until 25 ohms or less is achieved without connection to the building water piping. A typewritten test report shall be written.

D. Install panelboards to NEMA PB 1.1.

E. Provide labels for all, panelboards, and distribution equipment.

F. Provide label for each breaker/switch position in switchboards and distribution (feeder) panelboards.

G. Provide typewritten directory inside panel door for all panelboards.

END OF SECTION

SECTION 26 09 23 – LIGHTING CONTROLS AND DEVICES

PART 1 – GENERAL

1. SECTION INCLUDES

A. Network lighting control system and components:

1. Lighting management panels
2. Lighting management modules
3. Low voltage wall stations
4. Wired sensors

2. RELATED DOCUMENTS

A. Section 262726 Wiring Devices

B. Section 265100 Interior Lighting Fixtures

1.3 SUMMARY

A. The lighting control system specified in this section shall provide time-based, sensor-based (both occupancy and daylight), and manual lighting control

B. The system shall be capable of turning lighting loads on/off as well as dimming lights (if lighting load is capable of being dimmed). Specific dimmers will be capable of “dimming lights to off”

C. All system devices shall be networked together, enabling digital communication between devices.

D. The system architecture shall be capable of enabling stand-alone groups (rooms) of devices to function in some default capacity, even if network connectivity to the greater system is lost.

E. The system architecture shall facilitate remote operation via a computer connection.

1.4 SUBMITTALS

A. Product Datasheets (general device descriptions, dimensions, electrical specifications, wiring details, nomenclature)

B. Riser Diagrams – typical per room type (detailed drawings showing interconnectivity of devices)

C. Other Diagrams – as needed for special operation or interaction with other system(s)

D. Example Contractor Startup/Commissioning Worksheet – must be completed prior to factory start-up

E. Hardware and Software Operation Manuals.

F. Other operational descriptions as needed.

1.5 ON-SITE COMMISIONING REQUIREMENTS

A. Pre-Wire Meeting Requirements

1. Certified Technician will meet onsite with the electrical contractors to coordinate installation details, review best practices, and discuss project specific challenges. This should happen prior to the installation being started, enabling the contractors to work with a lighting systems expert to prepare and make changes up prior to installation commencement.

B. A manufacturer's lighting systems team works onsite, after fixture and controls installation is completed. The project is reviewed and checked for proper wiring, installation and functionality of the system as a whole. Any problems are addressed and resolved with the onsite contractors. If fixture addressing is required, the manufacturer's technicians will perform this task in accordance with the intended lighting design.

C. Onsite programming requirements

1. Manufacturer's technicians map out the fixture locations and addresses within the lighting control software. Astronomic timeclock events, scenes, and schedules are programmed per a pre-defined script. These events, scenes, and schedules are tested and finalized for final approval by the project's ownership.

D. Training requirements

1. Manufacturer's technicians provide training for system users and the system maintenance team. The details of the technology are covered from a maintenance and troubleshooting point of view. This covers the lighting control system and its core functionality, with a focus on how to edit existing scenes and astronomic lighting events.
2. The manufacturer's representative will provide in-depth training to the end user on managing the specific control system, giving them the tools and knowledge to operate their system.

1.6 PROJECT CLOSEOUT DOCUMENTATION

A. Provide a factory published manual

1. Warranty
2. Technical support contact
3. Electronic manual on manufacturer's website for free download

1.5 QUALITY ASSURANCE

A. All components and the manufacturing facility where product was manufactured must be RoHS compliant.

B. In high humidity or cold environments, the sensors shall be conformably coated and rated for condensing humidity and -40 degree Fahrenheit (and Celsius) operation.

C. All applicable products must be UL / CUL Listed or other acceptable national testing organization.

1.6 PROJECT CONDITIONS

A. Only install equipment after the following site conditions are maintained:

1. Ambient Temperature 14 to 105 degrees F (-10 to 40 degrees C)
2. Relative Humidity less than 90% non-condensing

B. Standard electrical enclosures are permanently installed

C. Equipment is protected from dust, debris and moisture

1.7 WARRANTY

A. Five (5) year 100% parts replacement

1.8 MAINTENANCE & SUSTAINABILITY

A. Provide new parts, upgrades, and/or replacements available for a minimum of 5 years available to the end user

B. Provide free telephone technical support

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Basis of controls design Manufacturer:
Acuity Brands, One Lithonia Way
Conyers GA 30012
www.acuitycontrols.com

B. Substitutions: Permitted with PRIOR APPROVAL ONLY:

1. All substitutions must be submitted in writing for approval at least 14 days prior to bid date.
2. Proposed substitute products must be documented with a line by line compliance review.

3. Proposal substitute must provide contractor submittal revised lighting plans, lighting control risers and details.

2.2 SYSTEM REQUIREMENTS

A. System shall have an architecture that is based upon three main concepts;

1. Intelligent lighting control devices

2. Standalone lighting control zones
3. Network backbone for remote or time based operation.

B. Intelligent lighting control devices shall consist of one or more basic lighting control components; occupancy sensors, photocell sensors, relays, dimming outputs, manual switch stations, and manual dimming stations. Combining one or more of these components into a single device enclosure should be permissible so as to minimize overall device count of system.

C. System must interface directly with LED luminaires.

D. Lighting control zones shall consist of one or more intelligent lighting control components, be capable of stand-alone operation, and be capable of being connected to a higher level network backbone.

E. Individual lighting zones must continue to provide a user defined default level of lighting control in the event of a system communication failure with the backbone network or the management software becoming unavailable.

F. Power for devices within a lighting control zone shall come from either resident devices already present for switching (relay device) or dimming purposes, controls enabled luminaires, or from the network backbone. Standalone “bus power supplies” shall not be required in all cases.

G. System shall have one or more primary wall mounted network control “gateway” devices that are capable of accessing and controlling connected system devices and linking into an Ethernet LAN.

H. System shall have a web-based software management program that enables remote system control, status monitoring, and creation of lighting control schedules and profiles.

I. Individual lighting zones shall be capable of being segmented into several “local” channels of occupancy, photocell, and switch functionality for more advanced configurations and sequences of operation.

J. Devices located in different lighting zones shall be able to communicate occupancy, photocell (non-dimming), and switch information via the wired backbone.

K. System shall be capable of operating a lighting control zone according to several sequences of operation. System shall be able to change a spaces sequence of operation according to a time schedule so as to enable customized time-of-day, day-of-week, utilization of a space. Note: Operating modes should be utilized only in manners consistent with local energy codes.

1. Auto-On / Auto-Off (via occupancy sensors)
   a. Zones with occupancy sensors automatically turn lights on when occupant is detected.
   b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.
   c. Pressing a switch will turn lights off. The lights will remain off regardless of occupancy until switch is pressed again, restoring the sensor to Automatic On functionality.
2. Manual-On / Auto-Off (also called Semi-Automatic)
   a. Pushing a switch will turn lights on.
   b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.

3. Manual-On to Auto-On/Auto-Off
   a. Pushing a switch will turn lights on.
   b. After initial lights on, zones with occupancy and/or photocell sensors turn lights on/off according to occupancy/vacancy and/or daylight conditions.
   c. Sequence can be reset via scheduled (ex. daily each morning) events.
4. Auto-to-Override On
   a. Zones with occupancy sensors automatically turn lights on when occupant is detected.
   b. Zone lighting then goes into an override on state for a set amount of time, or until the next time event returns the lighting to an auto-off style of control.
   c. Sequence can be reset via scheduled (ex. daily each morning) events.
5. Manual-to-Override On
   a. Pushing a switch will turn lights on.
   b. Zone lighting then goes into an override on state for a set amount of time or until the next time event returns the lighting to an auto-off style of control.
   c. Sequence can be reset via scheduled (ex. daily each morning) events.
6. Auto On / Predictive Off
   a. Zones with occupancy sensors automatically turn lights on when occupant is detected.
   b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.
   c. Pressing the switch will turn the lights off and a short “exit timer” begins. After the timer expires, sensor scans the room to detect whether occupant is still present. If no occupancy is detected, zone returns to auto-on. If occupancy is detected, lights must be turned on via the switch.
7. Multi-Level Operation (multiple lighting levels per manual button press)
   a. Operating mode designed specifically for bi-level applications.
   b. Enables the user to cycle through up to four potential on/off/dim low/dim high lighting states using only a single button.
   c. Eliminates user confusion as to which of two buttons controls which load
   d. Three different transition sequences are available in order to comply with energy codes or user preference).
   e. Mode available as a setting on all devices that have single manual on/off switch.
   f. Depending on the sequence selected, every button push steps through relay/dimming states according to below table
   g. In addition to achieving bi-level lighting control by switching loads with relays, the ability to command dimming outputs to “step” in a sequence that achieves bi-level operation is present.

MLO Mode		State of load after each pushbutton press			
		1st Press	2nd Press	3rd Press	4th Press
2-State (Alternating)	Load A	On	Off	Off	-
	Load B	Off	On	Off	-
2-State (Both On, A First)	Load A	On	On	Off	-
	Load B	Off	On	Off	-
2-State (Both On, B First)	Load A	Off	On	Off	-
	Load B	On	On	Off	-
3-State	Load A	On	Off	On	Off
	Load B	Off	On	On	Off
A and B On [1]	Load A	On	Off	-	-
	Load B	On	Off	-	-
A On Only [1]	Load A	On	Off	-	-
	Load B	Off	Off	-	-
A and B On & Dim High [1]	Load A	High	Off	-	-
	Load B	High	Off	-	-
Dim Low /High	Load A	Low	High	Off	-
Dim Low / High	Load A	High	Low	Off	-

NOTE 1: Modes for use only when Auto-On state of Load A & B is different than first MLO state

L. A taskbar style desktop application shall be available for personal lighting control.

M. An application that runs on “smart” handheld devices (such as an Apple® IPhone®) shall be available for personal lighting control.

N. Control software shall enable logging of system performance data and presenting this information in a web-based format and downloadable to .CSV files.

O. Control software shall enable integration with a BMS via BACnet IP, although a hardware BACnet IP integration solution is also available.

2.3 INDIVIDUAL DEVICE SPECIFICATIONS

A. Control module (gateway)

1. Control module shall be a device that facilitates communication and time-based control of downstream network devices and linking into an Ethernet network.
2. Devices shall have a user interface that is capable of wall mounting and be powered by low voltage.
3. Device shall have a standard and astronomical internal time clock.
4. Device shall have one RJ-45 10/100 BaseT Ethernet connection.
5. Device shall have a USB port
6. Device shall be capable of using a dedicated static or DHCP assigned IP address.

B. Networked system occupancy sensors

1. Occupancy sensors shall sense the presence of human activity within the desired space and fully control the on/off function of the lights.
2. Sensors shall utilize passive infrared (PIR) technology, which detects occupant motion, to initially turn lights on from an off state, thus preventing false on conditions. Ultrasonic or Microwave based sensing technologies shall not be accepted.
3. For applications where a second method of sensing is necessary to adequately detect maintained occupancy (such as in rooms with obstructions), a sensor with an additional “dual” technology shall be used.
4. Dual technology sensors shall have one of its two technologies not require motion to detect occupancy. Acceptable dual technology includes PIR/Microphonics (also known as Passive Dual Technology or PDT) which both looks for occupant motion and listens for sounds indicating occupants. Sensors where both technologies detect motion (PIR/Ultrasonic) shall not be acceptable.
5. All sensing technologies shall be acoustically passive, meaning they do not transmit sounds waves of any frequency (for example in the Ultrasonic range), as these technologies have the potential for interference with other electronic devices within the space (such as electronic white board readers). Acceptable detection technologies include Passive Infrared (PIR), and/or Microphonics technology. Ultrasonic or Microwave based sensing technologies shall not be accepted.
6. Sensors shall be available with zero or one integrated dry contact switching relays, capable of switching 1 amp at 24 VAC/VDC (resistive only).
7. Sensors shall be available with one or two occupancy “poles”, each of which provides a programmable time delay.
8. All sensors shall have two RJ-45 ports or capable of utilizing a splitter.
9. All sensors shall have the ability to detect when it is not receiving valid communication and blink its LED in a pattern to visually indicate of a potential wiring issue
10. Every sensor parameter shall be available and configurable remotely from the software and locally via the device push-button.
11. Sensors shall be able to function together with other sensors in order to provide expanded coverage areas.
12. Sensors shall be equipped with an automatic override for 100 hour burn-in of lamps. This feature must be available at any time for lamp replacements.
13. Wall switch sensors shall recess into single-gang switch box and fit a standard GFI opening.
14. Wall switch sensors must meet NEC grounding requirements by providing a dedicated ground connection and grounding to mounting strap. Line and load wire connections shall be interchangeable. Sensor shall not allow current to pass to the load when sensor is in the unoccupied (Off) condition.
15. Wall switch sensors shall have optional features for photocell/daylight override, and low temperature/high humidity operation.
16. Wall switch sensors shall be available in four standard colors (Ivory, White, Light Almond, Gray)
17. Wall switch sensors shall be available with optional raise/lower dimming adjustment controls.
18. Network system shall have sensors that can be embedded into luminaire such that only the lens shows on luminaire face.
19. Embedded sensors shall be capable of both PIR and Dual Technology occupancy detection
20. Embedded sensors shall have an optional photocell
21. Network system shall also have ceiling, fixture, recessed, & corner mounted sensors available.

22. Sensors shall have optional features for photocell/daylight override, dimming control, and low temperature/high humidity operation.

C. Networked system daylight (photocell and/or dimming) sensors

1. Photocell shall provide for an on/off set-point, and a deadband to prevent the artificial light from cycling. Delay shall be incorporated into the photocell to prevent rapid response to passing clouds.
2. Photocell and dimming sensor's set-point and deadband shall be automatically calibrated through the sensor's microprocessor by initiating an "Automatic Set-point Programming" procedure. Min and max dim settings as well as set-point may be manually entered.
3. Deadband setting shall be verified and modified by the sensor automatically every time the lights cycle to accommodate physical changes in the space (i.e., furniture layouts, lamp depreciation, or lamp outages).
4. Photocell and dimming sensors shall be equipped with an automatic override for 100-hour burn-in of lamps. This feature must be available at any time for lamp replacements. (Note: This function should be performed prior to any dimming of the lamps including the "auto set-point" setting.)
5. Combination units that have all features of on/off photocell and dimming sensors shall also be available.
6. A dual zone option shall be available for On/Off Photocell, Automatic Dimming Control Photocell, or Combination units. The second zone shall be capable of being controlled as an "offset" from the primary zone.
7. Network system shall have dimming photocells that can be embedded into luminaire such that only the lens shows on luminaire face.

D. Networked system power (relay) packs

1. Power Packs shall incorporate one Class 1 relay, a 0-10 VDC dimming output, and contribute low voltage power to the rest of the system. Secondary Packs shall incorporate the relay and 0-10 VDC or line voltage dimming output but shall not be required to contribute system power. Power Supplies shall provide system power only but are not required to switch line voltage circuit.
2. Power Packs shall accept 120 or 277 VAC (or optionally 347 VAC), be plenum rated, and provide Class 2 power to the system.
3. Every Power Pack parameter shall be available and configurable remotely from the software and locally via the device push-button.
4. Power Pack shall securely mount to junction location through a threaded ½ inch chase nipple or be capable of being secured within a luminaire ballast channel. Plastic clips into junction box shall not be accepted. All Class 1 wiring shall pass through chase nipple into adjacent junction box without any exposure of wire leads. Note: UL Listing under Energy Management or Industrial Control Equipment automatically meets this requirement, whereas Appliance Control Listing does not meet this safety requirement.
5. When required by local code, Power Pack must install inside standard electrical enclosure and provide UL recognized support to junction box. All Class 1 wiring is to pass through chase nipple into adjacent junction box without any exposure of wire leads.
6. Power Packs (Secondary) shall be available that provide up to 16 Amp switching of all lighting load types.
7. Power Packs shall be available that provide up to 5 Amps switching of all lighting load types as well as 0-10 VDC dimming or fluorescent ballasts/LED drivers.
8. Specific Secondary Packs shall be available that provide up to 5 Amps of switching and can dim 120/277 VAC magnetic low voltage transformers.

9. Specific Secondary Packs shall be available that provide up to 4 Amps of switching and can dim 120 VAC electronic low voltage transformers.
10. Specific Power/Secondary Packs shall be available that are UL924 listed for switching of Emergency Power circuits.
11. Specific Secondary Packs shall be available that control louver/damper motors for skylights.
12. Specific Secondary Packs shall be available that provide a pulse on/pulse off signal for purposes of controlling shade systems via relay inputs.
13. Power (Secondary) Packs shall be available that provide up to 20 Amps switching of general purposed receptacle (plug-load) control.

E. Networked auxiliary input / output (i/o) devices

1. Devices shall be plenum rated and be inline wired, screw mountable, or have an extended chase nipple for mounting to a ½" knockout.
2. Devices shall have two RJ-45 ports
3. Specific I/O devices shall have a dimming control output that can control 0-10 VDC dimmable ballasts or LED drivers by sinking up to 20 mA of current.
4. Specific I/O devices shall have an input that reads a 0-10 VDC signal from an external device.
5. Specific I/O devices shall have a switch input that can interface with either a maintained or momentary switch and run a switch event (toggle the lighting load) or run a local/remote control profile.
6. Specific I/O devices shall sense state of low voltage outdoor photocells.
7. Specific I/O devices shall sense momentary and maintained contact closures, and either toggle a connected load after a momentary contact or ramp the load high/low during a maintained contact (stopping when the contact releases).

F. Networked system wall switches & dimmers

1. Devices shall recess into single-gang switch box and fit a standard GFI opening.
2. All devices shall provide toggle switch control. Dimming control and low temperature/high humidity operation are available options.
3. Devices shall be available in four colors (Ivory, White, Light Almond, Gray).
4. Devices with mechanical push-buttons shall provide tactile and LED user feedback.
5. Devices with mechanical push-buttons shall be made available with custom button labeling
6. Devices with a single "on" button shall be capable of selecting all possible lighting combinations for a bi-level lighting zone such that the user confusion as to which of two buttons (as is present in multi-button scenarios) controls which load is eliminated.

G. Networked system scene controllers

1. Device shall have two, three, four, or eight buttons for selecting programmable lighting control profiles or acting as on/off switches.
2. Devices shall be available in four colors (Ivory, White, Light Almond, Gray).
3. Device shall recess into single-gang switch box and fit a standard GFI opening.
4. Devices shall provide LED user feedback.
5. Device shall be capable of reprogramming other devices in its zone so as to implement user selected lighting scene.

6. Device shall be capable of selecting a lighting profile be run by the system's upstream Gateway so as to implement selected lighting profile across multiple zones (and not just its local zone).
7. Device shall have LEDs indicating current selection.

H. Communication Bridges

1. Device shall surface mount to a standard 4" x 4" square junction box.
2. Device shall have 8 or more RJ-45 ports.
3. Device shall be capable of aggregating communication from multiple lighting control zones for purposes of minimizing backbone wiring requirements back to Control Gateway.
4. Device shall be powered with Class 2 low voltage supplied locally via a directly wired power supply or delivered via a CAT-5 cabled connection.
5. Device shall be capable of redistributing power from its local supply and connect lighting control zones with excess power to lighting control zones with insufficient local power.

2.4. LIGHTING CONTROL PROFILES

A. Changes to the operation of the system shall be capable of being made in real-time or scheduled via lighting control profiles. These profiles are outlines of settings that direct how a collection of devices function for a defined time period.

B. Lighting control profiles shall be capable of being created and applied to a single device, zone of devices, or customized group of zones.

C. All relays and dimming outputs shall be capable of being scheduled to track or ignore information regarding occupancy, daylight, and local user switches via lighting control profiles.

D. Specific device parameters (e.g. sensor time delay and photocell set-point) shall be configurable via a lighting control profile.

E. All lighting control profiles shall be stored on the network control gateway device, with a system backup on the software's host server.

F. Lighting control profiles shall be capable of being scheduled to run according to the following calendar options: start date/hour/minute, end date/hour/minute, and sunrise/sunset +/- timed offsets.

G. Sunrise/sunset times shall be automatically derived from location information using an astronomical clock.

H. Daylight savings time adjustments shall be capable of being performed automatically, if desired.

I. Lighting control profile schedules shall be capable of being given the following recurrence settings: daily, weekday, weekend, weekly, monthly, and yearly.

J. Software shall provide a graphical tool for easily viewing scheduled lighting control profiles.

2.5. MANAGEMENT SOFTWARE

A. Every device parameter (e.g. sensor time delay and photocell set-point) shall be available and configurable remotely from the software

B. The following status monitoring information shall be made available from the software for all devices for which it is applicable: current occupancy status, current PIR Status, current Microphonics Status, remaining occupancy time delay(s), current photocell reading, current photocell inhibiting state, photocell transitions time remaining, current dim level, device temperature, and device relay state(s).

C. The following device identification information shall be made available from the software: model number, model description, serial number, manufacturing date code, custom label(s), and parent network device.

D. A printable network inventory report shall be available via the software.

E. A printable report detailing all system profiles shall be available via the software.

F. Software shall require all users to login with a User Name and Password.

G. Software shall provide at least three permission levels for users.

H. All sensitive stored information and privileged communication by the software shall be encrypted.

I. All device firmware and system information shall be readily accessible.

J. Software shall be capable of managing systems interconnected via a WAN (wide area network)

2.6. BMS COMPATIBILITY

A. System shall provide a BACnet IP gateway as a downloadable software plug-in to its management software.

B. BACnet IP connection shall also be available utilizing JACE-600 hardware unit

C. BACnet IP connection shall communicate information gathered by networked system to other building management systems.

D. BACnet IP connection shall translate and forward lighting relay and other select control commands from BMS system to networked control devices via profiles stored in the system Gateway. All system devices shall be available for polling for devices status.

2.8. START-UP & SUPPORT FEATURES

A. To facilitate start-up, all devices shall automatically be grouped together into a functional lighting control zone.

B. All lighting control zones shall be able to function according to default settings once adequate power is applied and before any system software is installed.

C. Once software is installed, system shall be able to auto-discover all system devices without requiring any commissioning.

D. All system devices shall be capable of being given user defined names.

E. All devices within the network shall be able to have their firmware upgraded remotely and without being physically uninstalled for purposes of upgrading functionality at a later date.

F. All sensor devices shall have the ability to detect improper communication wiring and blink it's LED in a specific cadence as to alert installation/startup personnel.

END OF SECTION

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Single and duplex receptacles, ground-fault circuit interrupters, and integral surge suppression units.
2. Single- and double-pole snap switches and dimmer switches.
3. Device wall plates.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

C. Samples: One for each type of device and wall plate specified, in each color specified.

D. Field quality-control test reports.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 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. Wiring Devices:

   a. Bryant Electric, Inc./Hubbell Subsidiary.
   b. Hubbell Incorporated; Wiring Device-Kellems.
   c. Leviton Mfg. Company Inc.
   d. Pass & Seymour/Legrand; Wiring Devices Div.

2. Multioutlet Assemblies:

a. Hubbell Incorporated; Wiring Device-Kellems.
b. Wiremold Company (The).

2.2 RECEPTACLES

A. Straight-Blade-Type Receptacles: Comply with NEMA WD 1, NEMA WD 6, DSCC W-C-596G, and UL 498.

B. Straight-Blade and Locking Receptacles: Heavy-Duty grade.

C. Straight-Blade Receptacles: Manufacturer's top grade below Hospital grade.

D. GFCI Receptacles: Straight blade, feed-through type, Heavy-Duty grade, with integral NEMA WD 6, Configuration 5-20R duplex receptacle; complying with UL 498 and UL 943. Design units for installation in a 2-3/4-inch- (70-mm-) deep outlet box without an adapter.

2.3 PENDANT CORD/CONNECTOR DEVICES

A. Description: Matching, locking-type plug and receptacle body connector, NEMA WD 6, Configurations L5-20P and L5-20R, Heavy-Duty grade.

1. Body: Nylon with screw-open cable-gripping jaws and provision for attaching external cable grip.
2. External Cable Grip: Woven wire-mesh type made of high-strength galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.4 SWITCHES

A. Single- and Double-Pole Switches: Comply with DSCC W-C-896F and UL 20.

B. Snap Switches: Heavy-Duty grade, quiet type.

C. Combination Switch and Receptacle: Both devices in a single gang unit with plaster ears and removable tab connector that permit separate or common feed connection.

1. Switch: 20 A, 120/277-V ac.
2. Receptacle: NEMA WD 6, Configuration 5-20R.

D. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on/off switches and audible frequency and EMI/RFI filters.

1. Control: Continuously adjustable slider; with single-pole or three-way switching to suit connections.
2. LED Dimmer Switches: Modular; compatible with dimmer drivers; trim potentiometer to adjust low-end dimming; dimmer-driver combination capable of consistent dimming with low end not greater than 20 percent of full brightness.

2.5 WALL PLATES

A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Smooth Metal 302/304 stainless steel with satin finish.
3. Material for Unfinished Spaces: Smooth Metal 302/304 stainless steel with satin finish except where shown surface shall be “bell” die-cast aluminum with similar plates.
4. Material for Wet Locations: Cast aluminum with in-use lift cover, and listed and labeled for use in "wet locations."

2.6 FINISHES

A. Color:

1. Wiring Devices: Match existing

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install devices and assemblies level, plumb, and square with building lines.

B. Install wall dimmers to achieve indicated rating after derating for ganging.

C. Install unshared neutral conductors on line and load side of dimmers.

D. 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, multigang wall plates.

E. Remove wall plates and protect devices and assemblies during painting.

3.2 IDENTIFICATION

A. Comply with Division 26 Section "Identification for Electrical Systems."

3.3 CONNECTIONS

A. Ground equipment according to Division 26 Section "Grounding and Bonding."

B. Connect wiring according to Division 26 Section "Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. After installing wiring devices and after electrical circuitry has been energized, test every outlet for proper polarity, ground continuity, and compliance with requirements.
2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

B. Remove malfunctioning units, replace with new units, and retest as specified above.

END OF SECTION

SECTION 26 28 16 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following individually mounted, enclosed switches and circuit breakers:

1. Fusible switches.
2. Nonfusible switches.
3. Molded-case circuit breakers.
4. Enclosures.

1.2 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Field quality-control test reports.

D. Operation and maintenance data.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

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.

2.2 FUSIBLE AND NONFUSIBLE SWITCHES

A. Manufacturers:

1. Eaton Corporation; Cutler-Hammer Products.
2. Siemens Energy & Automation, Inc.
3. Square D/Group Schneider.
4. General Electric

B. Fusible Switch, 600 A and Smaller: NEMA KS 1, Type HD, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

C. Nonfusible Switch, 600 A and Smaller: NEMA KS 1, Type HD, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

D. 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; and labeled for copper and aluminum neutral conductors.
3. Auxiliary Contact Kit: Auxiliary set of contacts arranged to open before switch blades open.

2.3 MOLDED-CASE CIRCUIT BREAKERS AND SWITCHES

A. Manufacturers:

1. Eaton Corporation; Cutler-Hammer Products.
2. Siemens Energy & Automation, Inc.
3. Square D/Group Schneider.
4. General Electric

B. Molded-Case Circuit Breaker: NEMA AB 1, 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. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller and let-through ratings less than NEMA FU 1, RK-5.
4. GFCI Circuit Breakers: Single- and two-pole configurations with 5-mA trip sensitivity.

C. Molded-Case Circuit-Breaker Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Mechanical style suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.

4. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
5. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.

2.4 ENCLOSURES

A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.

1. Outdoor Locations: NEMA 250, Type 3R.
2. Kitchen Areas: NEMA 250, Type 4XSS except floor receptacles for kitchen distribution shall be as detailed on drawings.
3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with applicable portions of NECA 1, NEMA PB 1.1, and NEMA PB 2.1 for installation of enclosed switches and circuit breakers.

B. Mount individual wall-mounting switches and circuit breakers with tops at uniform height, unless otherwise indicated.

C. Comply with mounting and anchoring requirements specified in Division 26 Section "Electrical Supports."

D. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26 Section " Identification for Electrical Systems."

3.2 FIELD QUALITY CONTROL

A. Prepare for acceptance testing as follows:

1. Inspect mechanical and electrical connections.
2. Verify switch and relay type and labeling verification.
3. Verify rating of installed fuses.

B. Perform the following field tests and inspections and prepare test reports:

1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. 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.

END OF SECTION

SECTION 26 43 13 - SURGE PROTECTIVE DEVICES

PART 1 – GENERAL

1.1 SUMMARY:

This section describes the quality, performance, and installation of Parallel Connected, AC Power, Panel Type, Surge Protective Devices (SPDs).

1.2 QUALITY ASSURANCE:

All Surge Protective Devices (SPDs) shall be tested and *listed* to *ANSI/UL 1449-2006* (*UL 1449 3rd Edition*) and Complimentary Listed to UL 1283 by an independent testing agency, with the experience and capability 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. This agency must comply with ANSI/IEEE C62.45 test procedures for all categories established in C62.41 (1991). “Manufactured in accordance with UL 1449” is not equivalent to being listed to ANSI/UL 1449-2006 and does not meet the intention of this specification.

1.3 CODES AND STANDARDS:

A. ANSI/IEEE Std C62.41.1™-2002, IEEE Guide on the Surge Environment in Low- Voltage (1000 V and Less) AC Power Circuits

B. ANSI/IEEE Std C62.41.2™-2002, IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits

C. ANSI/IEEE Std C62.45™ -2002, IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000 V and Less) AC Power Circuits

D. ANSI C84.1, American National Standard for Electric Power Systems and Equipment – Voltage Ratings (60 Hertz)

E. ANSI/IEEE Standard 1100-2005, IEEE Recommended Practice for Power and Grounding Electronic Equipment (Emerald Book) - Clause 8.6.1

F. National Fire Protection Association (NFPA) 70 (N.E.C.) – 2002 - Article 285

G. ANSI/UL Standards 1449-2006 Listed (UL 1449 Third Edition), UL 1283 Listed, CUL Listed & CE compliant “low-voltage directive.”

H. IEEE Standard C62.72™ - 2007 – IEEE Guide for the Application of Surge-Protective Devices for Low-Voltage (1000 V or less) AC Power Circuits

1.4 MANUFACTURER QUALIFICATIONS:

A. All surge suppression devices shall be manufactured by an ISO 9001-2000 certified company normally engaged in the design, development, and manufacture of such equipment, with at least 10 years of engineering experience in the design and manufacture of permanently connected SPD devices.

B. The surge suppressor manufacturer shall provide unlimited free replacement of the entire SPD for all inoperable SPD units during the warranty period.

C. Subject to compliance with specification requirements, provide products by one of the following:

1. Surge Suppression Incorporated

2. Intermatic, Inc

3. Liebert

4. Advanced Protection Technologies

1.5 SUBMITTALS:

A. Surge suppression submittals shall include, but shall not be limited to the following items:

B. Complete schematic data for all suppressors indicating part numbers, conductor sizes, etc.

C. Dimensioned drawing of each suppressor type indicating mounting arrangement.

D. Manufacturer's ANSI/UL 1449-2006 Third Edition listing classification page and listing number(s).

E. Manufacturer's UL 1283 listing classification page and listing number(s).

F. Certified test data from independent third party NRTL documenting ANSI/IEEE C62.41-2002 performance and the ability of the device to meet or exceed all requirements of this specification. Include complete let-through voltage/measured limiting voltage test data (not Voltage Protection Rating), test graphs, and scope traces for each mode for each product submitted for Category's C, B, A (including Cat A, 2 kV, 67 A, 100 kHz ring wave at both 90 & 270-degree electrical phase angles).

G. Letter from manufacturer stating products are in strict compliance with the recommendations of IEEE Standard 1100-2005, Clause 8.6.1 and incorporate 10 individual dedicated discrete modes of protection for three-phase Wye systems, including direct line-to-line components. (Reduced-mode variations will not be accepted).

H. Certificate of declaration that product is CE low voltage directive compliant

I. Statement of manufacturer's warranty duration and replacement policy.

PART 2 - PRODUCTS

2.1 REQUIREMENTS:

A. All SPDs shall be tested and listed to ANSI/UL 1449-2006 (UL 1449 3rd Edition) & Complimentary Listed to UL 1283 by a Nationally Recognized Testing Laboratory (NRTL) (i.e. CSA, UL, etc)

B. The Surge Protective Devices (SPDs) shall be of a parallel-connected design using fast-acting transient energy protection components that will divert and dissipate the surge energy.

C. The SPD shall be self-restoring and fully automatic.

D. The SPD shall be tested and listed by an NRTL as a complete assembly to a symmetrical fault current rating greater than or equal to the available fault current at the location of installation at

the connected panel, in accordance with NEC Article 285 and shall be marked with the short circuit current rating (SCCR). If the available fault current is unknown, then the SCCR of the SPD shall be 200 kAIC.

E. Permanently connected devices mounted parallel to the service, and 208/120V sub panels are required.

F. The SPD shall have a Nominal Discharge Current (I_n) of 20 kA. ((The Nominal Discharge Current Test was designed to establish that the SPD remains functional after 15 surges at various currents (3 kA, 5 kA, 10 kA, and 20 kA) using the test procedure described in ANSI/UL 1449-2006. 20kA is the most severe.))

Fusing:

1. The SPD shall provide as a minimum, over-current, over temperature protection in the form of component-level thermal fusing to ensure safe failure and prevent thermal runaway. This component-level fusing shall be an integral part of the MOV itself and not silver wire (or other) independently laid across each MOV.

2. Surge protective devices shall contain integral short circuit current safety fusing within each device for over-current requirements of the NEC. This fusing will be independent of the “component-level” fusing and be specifically for over-current protection and shall be constructed utilizing surge rated, cartridge fuses and not rated ‘silver-fuse-wire’ (or other).

3. <u>The use of any mechanical or electro-mechanical thermal/over-current protection (i.e. moving parts and/or springs and shutters) in combination with or for the protection of the suppression elements is not permitted</u>.

4. The fusing mechanisms employed must effectively coordinate their performance in conjunction with the high current abnormal over-voltage testing under ANSI/UL 1449-2006 (<u>a.k.a. UL 1449 3rd Edition</u>).

MCOV: The SPD shall have a maximum continuous operating voltage (MCOV) capable of sustaining 115% of nominal RMS voltage continuously without degrading.

Component Limitations: The SPD shall only use solid-state clamping components to limit the surge voltage and divert the surge current. SPD components that “crowbar” short-circuit the AC power system (e.g. spark gaps, gas tubes, selenium cells, or SCR’s) shall not be acceptable. Device circuitry shall be bi-directional, enclosed in a UL listed encapsulated thermal stress reducing compound, and be of a parallel design.

Protection Modes: The SPD system shall provide (per IEEE Std. 1100-1999 8.6.1) dedicated, independent, distinct, individual protection circuitry for every possible mode in the electrical distribution system at the point of SPD application. For example, a 277/480V or 120/208V, 3-phase Wye, 4-wire plus ground system has 10 distinct modes that require independent and dedicated protection (i.e., L1-L2, L2-L3, L3-L1, L1-N, L2-N, L3-N, L1-G, L2-G, L3-G, N-G). None of these modes of protection depend on protection elements purposed for other protection modes. Reduced mode SPD with only 3, 4, or 7 dedicated, distinct, independent protection modes are not acceptable. When a mode of protection is specified, the protective mode shall be included. Thus, Line-to-Neutral-to-Line is *not acceptable* where Line-to-Line is Specified.

Status Indicators: SPD units shall have panel front status monitors as a minimum to indicate a continuous positive status of each protected phase. A remote audible alarm option must be supplied where the specifying engineer deems it necessary and cost effective under the circumstances. Refer to the appropriate drawings and schedules for these details.

Equipment Certification: Items shall be listed to ANSI/UL 1449-2006, shall bear the seal of the NRTL, shall bear the Marking "Listed to UL 1449", shall have been tested under ANSI/UL 1449-2006, and shall be marked in accordance with the referenced standard. SPD units shall be UL 1283 Listed as an Electromagnetic Interference Filter and marked accordingly. All surge suppression devices shall be manufactured by an ISO 9001-2001 certified company normally engaged in the design, development, and manufacture of such equipment.

Circuit Configuration: The circuit configuration of the suppression units shall be bi-directional, thermal stress reducing, encapsulated, custom parallel connected, and solid state. (Series units or units equipped with "load carrying" components are expressly prohibited due to the possibility of single point series failures causing power interruption to protected loads.)

Enclosures: Unless otherwise noted, provide NEMA 1 or better enclosure for indoor mounting and NEMA 4 enclosure or better for all outdoor locations. All units will contain Form C, N/O or N/C, dry relay contacts, if so specified, and weatherproof fittings to maintain the required NEMA integrity.

Maintenance Restrictions: No suppression unit shall be supplied which requires scheduled preventive maintenance or replacement parts. Units requiring functional testing, special test equipment, or special training to monitor surge protection device (SPD) status are not acceptable. SPD shall require NO routine maintenance. SPD devices are considered non-repairable items and shall be fully replaced upon failure.

Commonality: All SPDs at the service entrance, distribution panels, and sub-panels shall be from the same manufacturer.

All SPDs shall meet or exceed the following performance criteria:

Service Entrance (Category C): Service Entrance (Category C): The SPD shall provide a minimum protection of 240kA per phase (three-phase Wye) and be capable of meeting the Category C-High Let-Through Voltage criteria as shown in the Section VII, below.

Branch Panels/Panelboards (Category A): The SPD shall provide a minimum protection of 120kA per phase and be capable of meeting the Category B-High Let-Through Voltage criteria as shown in the Section VII, below.

2.2 ANSI/IEEE C62.41 LET-THROUGH VOLTAGE

A. The SPD shall meet the Let-Through Voltage requirements shown in the tables below for voltage and locations specified. All voltages shall be peak (±10%) Positive Polarity, Time base = 10µS, Sampling Rate = 500ms/s to ensure maximum transient capture. [These settings assure Let-through Voltage test results are accurate]. Surge voltages shall be measured from the insertion of the surge on the sine wave to the peak of the surge. All tests are Static (unpowered), except for the 120V circuits that are Dynamic (powered). Let-through voltages on static tests calculated by subtracting sine wave peak from let-through measured from zero. All tests shall be performed in accordance with UL 1449 Third Edition with measurements performed at a point on the leads 15.24 cm (6 inches) outside of the device enclosure. No data measured at a module, lugs, component, or undefined location will be accepted. These settings assure Let-through Voltage test results are accurate. SPDs shall meet the following criteria:

Service Entrance: (277/480V, 3 Phase 4 Wire)

ANSI/IEEE Cat. C Impulse Wave The let-through voltage based on ANSI/IEEE C62.41 and C62.45 recommended procedures for the ANSI/IEEE Cat. C Impulse Wave (20kV, 10,000 amps) at the 90 degree phase angle, shall be less than (values are total let-through voltage (LTV) measured from the insertion point of the transient on the sine wave to the peak of the transient):

Mode / Voltage	277/480Y
L-N	1075V
L-L	1350V
L-G	1275V
N-G	1585V

Panelboards: (120/208V 3 Phase 4 Wire)

ANSI/IEEE Cat. B Combination Wave Impulse Let-Through Voltage: The let-through voltage based on ANSI/IEEE C62.41 and C62.45 recommended procedures for the ANSI/IEEE Cat. B Combination Wave Impulse (6kV, 3000 amps) at the 90-degree phase angle, shall be less than; (values are total let-through voltage (LTV) measured from the insertion point of the transient on the sine wave to the peak of the transient):

Mode / Voltage	120/208Y
L-N	390V
L-L	580V
L-G	400V
N-G	575V

PART 3 - EXECUTION

3.1 WARRANTY

A. All SPD devices shall be warranted to be free from defects in materials and workmanship under normal use in accordance with the instructions provided for a period of ten (10) years from date of substantial completion.

B. Any SPD device that shows evidence of failure or incorrect operation, including damage as the result of lightning strikes, during the warranty period shall be replaced as a complete unit (not just modules, subassemblies, or components) by the manufacturer at no charge to the owner. Warranty will provide for multiple exchanges of any inoperable devices at any time during the warranty period that starts at the date of substantial completion of the system to which the surge suppressor is installed.

C. SPD manufacturers whose warranty does not meet the requirements listed above standard shall submit a letter extending the warranty to meet these standards with the product submittal.

3.2 INSTALLATION

A. Provide surge suppressor at each building service entrance and at other distribution and panelboard locations as indicated on the drawings. The SPD shall be located immediately adjacent to the switchboard or panelboard being protected (close-nipple to panel-boards). The SPD may not be located integral (switchgear manufacturer installed) within the switchboard or panelboard(s) unless the switchgear manufacturer providing such SPD products expressly meets or exceeds ALL parameters of this specification for the SPD. These SPDs shall be

individually tested and Listed to ANSI/UL 1449-2006 according to their type and not be listed solely as part of the larger assembly. SPD devices not meeting or exceeding the performance of this specification will be deemed unacceptable.

B. Do not energize or connect service entrance equipment and panelboards to their sources until TVSS devices are properly installed and connected.

C. Do not perform insulation resistance tests of the distribution wiring equipment with the TVSS installed. Disconnect before conducting insulation resistance tests, and reconnect immediately after the testing is over.

D. Install the SPD with #10 AWG minimum conductors to dedicated 30-amp breaker(s) in panel per manufacturer's installation instructions and close to the Neutral Bus. The dedicated breaker shall serve as a means of service disconnect for the SPD so that the electrical panel remains energized during SPD servicing. The installer may rearrange breaker locations to ensure the shortest and straightest leads to the SPD. If a dedicated breaker is not provided, an SPD with internal 30-amp fuse or a UL Listed fused disconnect switch shall be installed as a minimum. The conductors serving the SPD shall be twisted together (one twist per 12" of wire) to reduce the SPD system input impedance and shall be kept at the minimum length. The SPD shall be installed in strict accordance with the manufacturer's recommended practices and in compliance with N.E.C. requirements, State, and Local Codes.

E. Lead lengths shall not exceed 18 inches.

F. The electrical contractor shall verify the proper application of the SPD (i.e., voltage, phases, etc.). The electrical contractor shall ensure that all Neutral conductors are bonded to the system Ground at the service entrance or the serving isolation transformer prior to installation of the associated SPD. The electrical contractor will ensure that neutral-to-ground bonds do not exist at locations that are not service entrances or newly derived power sources.

G. The electrical contractor shall furnish all labor, materials, equipment, and services necessary for and incidental to the installation of the SPD system components as specified herein.

H. The electrical contractor shall coordinate with other electrical work as necessary to interface installation of the transient voltage surge suppression systems with other work on the site.

I. The SPD installation shall be certified by a licensed electrician that the installation is in accordance with the manufacturer's recommendations, applicable electrical code requirements and the requirements of the specification above. Any deficiencies noted shall be corrected by the Contractor. Provide written documentation of this inspection as part of the closeout documentation.

J. The Manufacturer or qualified representative shall inspect the final installation and conduct a four-hour scheduled familiarization and maintenance instruction with Administration and Maintenance personnel.

END OF SECTION

SECTION 26 51 00 - INTERIOR LIGHTING

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 lighting fixtures.
2. Emergency lighting units.
3. Exit signs.
4. Lighting fixture supports.

B. Related Sections include the following:

1. Division 26 Section "Lighting Controls and Devices" for manual or programmable control systems employing low-voltage control wiring or data communication circuits.
2. Division 26 Section "Wiring Devices" for manual wall-box dimmers for fluorescent lamps or LED technology.

1.3 DEFINITIONS

A. CRI: Color-rendering index.

B. CU: Coefficient of utilization.

C. HID: High-intensity discharge.

D. LER: Luminaire efficacy rating.

E. Luminaire: Complete lighting fixture, including ballast/driver housing if provided.

F. RCR: Room cavity ratio.

G. SSL: Solid State Lighting (LED)

H. BUG Rating: Backlight, Uplight, Glare Rating.

1.4 SUBMITTALS

A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
   1. Physical description of lighting fixture including dimensions.
   2. Emergency lighting units including battery and charger.
   3. Driver.
   4. Energy-efficiency data.
   5. Life, output, and energy-efficiency data for lamps.
   6. Photometric data, in IESNA format, based on laboratory tests of each lighting fixture type, outfitted with lamps, ballasts, drivers, and accessories identical to those indicated for the lighting fixture as applied in this Project.
      a. For indicated fixtures, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining fixtures shall be certified by the manufacturer.
      b. Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program (NVLAP) for Energy Efficient Lighting Products.

B. Shop Drawings: Show details of nonstandard or custom lighting fixtures. Indicate dimensions, weights, methods of field assembly, components, features, and accessories.

C. Wiring Diagrams: Power and control wiring.

D. Coordination Drawings: Reflected ceiling plan(s) and other details, 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. Lighting fixtures.
   2. Suspended ceiling components.
   3. Structural members to which suspension systems for lighting fixtures will be attached.
   4. Other items in finished ceiling including the following:
      a. Air outlets and inlets.
      b. Speakers.
      c. Sprinklers.
      d. Smoke and fire detectors.
      e. Occupancy sensors.
      f. Access panels.
      g. Perimeter moldings.
   5. Product Certificates: For each type of ballast for bi-level and dimmer-controlled fixtures, signed by product manufacturer.
   6. Qualification Data: For agencies providing photometric data for lighting fixtures.
   7. Field quality-control test reports.
   8. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.
   9. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.

B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with NFPA 70.

E. FMG Compliance: Lighting fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FMG.

1.6 COORDINATION

A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.7 WARRANTY

A. Special Warranty for Emergency Lighting Batteries:

1. Warranty Period for Self-Powered Exit Sign Batteries: 5 years from date of Substantial Completion. Full warranty shall apply for full 5 years, no prorated warranties are permitted.

B. Special Warranty for Drivers: Manufacturer's standard form in which driver manufacturer agrees to repair or replace drivers that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Electronic Drivers: 5 years from date of Substantial Completion.
2. Warranty Period: Two year(s) from date of Substantial Completion.

1.8 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. Plastic Diffusers and Lenses: 1 for every 100 of each type and rating installed. Furnish at least one of each type.
2. Battery and Charger Data: One for each emergency lighting unit.
3. Drivers: 1 for every 100 of each type and rating installed. Furnish at least one of each type.
4. Globes and Guards: 1 for every 20 of each type and rating installed. Furnish at least one of each type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

B. In Interior Lighting Fixture Schedule where titles below are column or row headings that introduce lists, the following requirements apply to 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, manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
3. Basis-of-Design Product: The design for each lighting fixture 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 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

B. LED Fixtures: Comply with UL 8750. Test according to Illuminating Engineering Society of North America (IESNA) LM-80 standards.

C. Metal Parts: Free of burrs and sharp corners and edges.

D. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.

E. 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.

F. 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.
4. Laminated Silver Metalized Film: 90 percent.

G. Plastic Diffusers, Covers, 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 different thickness is indicated.
   b. UV stabilized.

2.3 LED TROFFERS

A. Description: Led lighting fixtures shall have long life replaceable LEDs (where applicable) coupled with high-efficiency drivers, provide superior quality and quality of illumination for extended service life. Fixture shall be rated to deliver specified performance for 50,000 hours.

B. Fixtures noted to be dimmable shall have 0-10-volt control. COORDINATE with dimming system.

C. Fixtures shall provide (degree) K color temperatures as indicated on drawings.

D. Fixtures shall have a minimum of 5-year warranty

E. LM-79-08, IESNA Approved Method for the Electrical and Photometric Measurements of Solid-Sate Lighting Products

F. LM-80-08, IESNA Approved Method for Measuring Lumen Maintenance of LED Light Sources

2.4 EMERGENCY LIGHTING UNITS

A. Description: 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.

8. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
9. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and flashing red LED.

2.5 EXIT SIGNS

A. Description: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

2.6 LIGHTING FIXTURE SUPPORT COMPONENTS

A. Comply with Division 26 Section "Electrical 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.

2.7 REQUIREMENTS FOR INDIVIDUAL LIGHTING FIXTURES

A. Comply with requirements of Lighting Fixture Schedule on electrical drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

B. Support for Lighting Fixtures in or on Grid-Type Suspended Ceilings: Use grid as a support element.

1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches from lighting fixture corners.
2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
4. Install at least one independent support rod or wire from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.

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. Connect wiring according to Division 26 Section "Conductors and Cables."

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

SECTION 27 0526 - GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Grounding conductors.
2. Grounding connectors.
3. Grounding busbars.
4. Grounding rods.
5. Grounding labeling.

1.2 DEFINITIONS

A. BCT: Bonding conductor for telecommunications.

B. EMT: Electrical metallic tubing.

C. TGB: Telecommunications grounding busbar.

D. TMGB: Telecommunications main grounding busbar.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. As-Built Data: Plans showing as-built locations of grounding and bonding infrastructure, including the following:

1. Ground rods.
2. Ground and roof rings.
3. BCT, TMGB, TGBs, and routing of their bonding conductors.

B. Qualification Data: For **Installer,** installation supervisor, and field inspector.

C. Qualification Data: For testing agency and testing agency's field supervisor.

D. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installation Supervision: Installation shall be under the direct supervision of ITS **Technician** who shall be present at all times when Work of this Section is performed at Project site.
2. Field Inspector: Currently registered by BICSI as an **RCDD** to perform the on-site inspection.

PART 2 - PRODUCTS

2.1 SYSTEM COMPONENTS

A. Comply with J-STD-607-A.

2.2 CONDUCTORS

A. Comply with UL 486A-486B.

B. Insulated Conductors: Stranded copper wire, green or green with yellow stripe insulation, insulated for 600 V, and complying with UL 83.

1. Ground wire for custom-length equipment ground jumpers shall be No. 6 AWG, 19-strand, UL-listed, Type THHN wire.
2. Cable Tray Equipment Grounding Wire: **No. 6** AWG.

C. 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 kcmils (14.2 sq. mm), 14 strands of No. 17 AWG conductor, and 1/4 inch (6.3 mm) in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Tinned-copper tape, braided conductors terminated with two-hole copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.3 CONNECTORS

A. Irreversible connectors listed for the purpose. Listed by an NRTL as complying with NFPA 70 for specific types, sizes, and combinations of conductors and other items connected. Comply with UL 486A-486B.

B. Compression Wire Connectors: Crimp-and-compress connectors that bond to the conductor when the connector is compressed around the conductor. Comply with UL 467.

1. Electroplated tinned copper, C and H shaped.

C. Busbar Connectors: Cast silicon bronze, solderless **compression**-type, mechanical connector; with a long barrel and two holes spaced on 5/8- or 1-inch (15.8- or 25.4-mm) centers for a two-bolt connection to the busbar.

D. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.4 GROUNDING BUSBARS

A. TMGB: Predrilled, wall-mounted, rectangular bars of hard-drawn solid copper, **1/4 by 4 inches** in cross section, length as indicated on Drawings. The busbar shall be NRTL listed for use as TMGB and shall comply with J-STD-607-A.

1. Predrilling shall be with holes for use with lugs specified in this Section.
2. Mounting Hardware: Stand-off brackets that provide a **4-inch** clearance to access the rear of the busbar. Brackets and bolts shall be stainless steel.
3. Stand-off insulators for mounting shall be Lexan or PVC. Comply with UL 891 for use in 600-V switchboards, impulse tested at 5000 V.

B. TGB: Predrilled rectangular bars of hard-drawn solid copper, **1/4 by 2 inches** in cross section, length as indicated on Drawings. The busbar shall be for wall mounting, shall be NRTL listed as complying with UL 467, and shall comply with J-STD-607-A.

1. Predrilling shall be with holes for use with lugs specified in this Section.
2. Mounting Hardware: Stand-off brackets that provide at least a 2-inch ((50-mm) clearance to access the rear of the busbar. Brackets and bolts shall be stainless steel.)
3. Stand-off insulators for mounting shall be Lexan or PVC. Comply with UL 891 for use in 600-V switchboards, impulse tested at 5000 V.

C. Rack and Cabinet Grounding Busbars: Rectangular bars of hard-drawn solid copper, accepting conductors ranging from No. 14 to No. 2/0 AWG, NRTL listed as complying with UL 467, and complying with J-STD-607-A. Predrilling shall be with holes for use with lugs specified in this Section.

1. Cabinet-Mounted Busbar: Terminal block, with stainless-steel or copper-plated hardware for attachment to the cabinet.
2. Rack-Mounted Horizontal Busbar: Designed for mounting in 19- or 23-inch (483- or 584-mm) equipment racks. Include a copper splice bar for transitioning to an adjoining rack, and stainless-steel or copper-plated hardware for attachment to the rack.
3. Rack-Mounted Vertical Busbar: 72 or 36 inches ((1827 or 914 mm) long, with) stainless-steel or copper-plated hardware for attachment to the rack.

2.5 GROUND RODS

A. Ground Rods: **Copper-clad**; **3/4 inch by 10 feet** in diameter.

2.6 LABELING

A. Comply with TIA 606 and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

B. Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the ac grounding electrode system and equipment grounding for compliance with requirements for maximum ground-resistance level and other conditions affecting performance of grounding and bonding of the electrical system.

B. Inspect the test results of the ac grounding system measured at the point of BCT connection.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with connection of the BCT only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Bonding shall include the ac utility power service entrance, the communications cable entrance, and the grounding electrode system. The bonding of these elements shall form a loop so that each element is connected to at least two others.

B. Comply with NECA 1.

C. Comply with J-STD-607-A.

3.3 APPLICATION

A. Conductors: Install solid conductor for **No. 8** AWG and smaller and stranded conductors for **No. 6** AWG and larger unless otherwise indicated.

1. The bonding conductors between the TGB and structural steel of steel-frame buildings shall not be smaller than **No. 6** AWG.
2. The bonding conductors between the TMGB and structural steel of steel-frame buildings shall not be smaller than **No. 6** AWG.

B. 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.

C. Conductor Support:

1. Secure grounding and bonding conductors at intervals of not less than 36 inches ((900 mm).)

D. Grounding and Bonding Conductors:

1. Install in the straightest and shortest route between the origination and termination point, and no longer than required. The bend radius shall not be smaller than eight times the diameter of the conductor. No one bend may exceed 90 degrees.
2. Install without splices.
3. Support at not more than 36-inch (900-mm) intervals.
4. Install grounding and bonding conductors in 3/4-inch (21-mm) PVC conduit until conduit enters a telecommunications room. The grounding and bonding conductor pathway through a plenum shall be in EMT. Conductors shall not be installed in EMT unless otherwise indicated.

   a. If a grounding and bonding conductor is installed in ferrous metallic conduit, bond the conductor to the conduit using a grounding bushing that complies with requirements in Section 270528 "Pathways for Communications Systems," and bond both ends of the conduit to a TGB.

3.4 GROUNDING ELECTRODE SYSTEM

A. The BCT between the TMGB and the ac service equipment ground shall not be smaller than **No. 3/0** AWG.

3.5 GROUNDING BUSBARS

A. Indicate locations of grounding busbars on Drawings. Install busbars horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 12 inches (300 mm) above finished floor unless otherwise indicated.

B. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.

3.6 CONNECTIONS

A. Bond metallic equipment in a telecommunications equipment room to the grounding busbar in that room, using equipment grounding conductors not smaller than **No. 6** AWG.

B. Stacking of conductors under a single bolt is not permitted when connecting to busbars.

C. Assemble the wire connector to the conductor, complying with manufacturer's written instructions and as follows:

1. Use crimping tool and the die specific to the connector.
2. Pretwist the conductor.
3. Apply an antioxidant compound to all bolted and compression connections.

D. Primary Protector: Bond to the TMGB with insulated bonding conductor.

E. Interconnections: Interconnect all TGBs with the TMGB with the telecommunications backbone conductor. If more than one TMGB is installed, interconnect TMGBs using the grounding equalizer conductor. The telecommunications backbone conductor and grounding equalizer conductor size shall not be less than 2 kcmils/linear foot (1 sq. mm/linear meter) of conductor

length, up to a maximum size of No. 3/0 AWG **168 kcmils (85 sq. mm)** unless otherwise indicated.

F. Telecommunications Enclosures and Equipment Racks: Bond metallic components of enclosures to the telecommunications bonding and grounding system. Install **top-mounted** rack grounding busbar unless the enclosure and rack are manufactured with the busbar. Bond the equipment grounding busbar to the TGB No. 2 AWG bonding conductors.

G. Structural Steel: Where the structural steel of a steel frame building is readily accessible within the room or space, bond each TGB and TMGB to the vertical steel of the building frame.

H. Electrical Power Panelboards: Where an electrical panelboard for telecommunications equipment is located in the same room or space, bond each TGB to the ground bar of the panelboard.

I. Shielded Cable: Bond the shield of shielded cable to the TGB in communications rooms and spaces. Comply with TIA 568 when grounding screened, balanced, twisted-pair cables.

J. Rack and Cabinet Mounted Equipment: Bond powered equipment chassis to the cabinet or rack grounding bar. Power connection shall comply with NFPA 70; the equipment grounding conductor in the power cord of cord- and plug-connected equipment shall be considered as a supplement to bonding requirements in this Section.

K. Access Floors: Bond all metal parts of access floors to the TGB.

3.7 IDENTIFICATION

A. Labels shall be preprinted or computer-printed type.

1. Label TMGB(s) with "fs-TMGB," where "fs" is the telecommunications space identifier for the space containing the TMGB.
2. Label TGB(s) with "fs-TGB," where "fs" is the telecommunications space identifier for the space containing the TGB.
3. Label the BCT and each telecommunications backbone conductor at its attachment point: "WARNING! TELECOMMUNICATIONS BONDING CONDUCTOR. DO NOT REMOVE OR DISCONNECT!"

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
2. Test the bonding connections of the system using an ac earth ground-resistance tester, taking two-point bonding measurements in each telecommunications equipment room containing a TMGB and a TGB and using the process recommended by BICSI TDMM. Conduct tests with the facility in operation.

a. Measure the resistance between the busbar and the nearest available grounding electrode. The maximum acceptable value of this bonding resistance is 100 milliohms.

3. Test for ground loop currents using a digital clamp-on ammeter, with a full-scale of not more than 10 A, displaying current in increments of 0.01 A at an accuracy of plus/minus 2.0 percent.

a. With the grounding infrastructure completed and the communications system electronics operating, measure the current in every conductor connected to the TMGB. Maximum acceptable ac current level is 1 A.

C. Excessive Ground Resistance: If resistance to ground at the BCT exceeds **5** ohms, notify Architect promptly and include recommendations to reduce ground resistance.

D. Grounding system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

END OF SECTION 270526

SECTION 27 0528 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal conduits and fittings.
2. Nonmetallic conduits and fittings.
3. Optical-fiber-cable pathways and fittings.
4. Surface pathways.
5. Boxes, enclosures, and cabinets.

1.2 ACTION SUBMITTALS

A. Product Data: For surface pathways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

A. General Requirements for Metal Conduits and Fittings:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with TIA-569.

B. GRC: Comply with ANSI C80.1 and UL 6.

C. ARC: Comply with ANSI C80.5 and UL 6A.

D. EMT: Comply with ANSI C80.3 and UL 797.

E. 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-467, rated for environmental conditions where installed, and including flexible external bonding jumper.

F. Joint Compound for 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 AND FITTINGS

A. General Requirements for Nonmetallic Conduits and Fittings:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with TIA-569.

B. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

C. Continuous HDPE: Comply with UL 651B.

D. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

E. 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).

2.3 OPTICAL-FIBER-CABLE PATHWAYS AND FITTINGS

A. Description: Comply with UL 2024; flexible-type pathway, approved for **plenum, riser or general-use** installation unless otherwise indicated.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with TIA-569.

2.4 SURFACE PATHWAYS

A. General Requirements for Surface Pathways:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with TIA-569.

B. Surface Nonmetallic Pathways: Two- or three-piece construction, complying with UL 5A, and manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard colors. Product shall comply with UL-94 V-0 requirements for self-extinguishing characteristics.

2.5 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets:

1. Comply with TIA-569.

2. 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. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, **aluminum**, Type FD, with gasketed cover.

D. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

E. Metal Floor Boxes:

1. Material: **Cast metal or sheet metal**.
2. Type: **Fully adjustable**.
3. 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.

F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

G. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, **cast aluminum** with gasketed cover.

H. Device Box Dimensions: **4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep)**.

I. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

J. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, **Type 1** OR **Type 3R** with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

K. 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.

PART 3 - EXECUTION

3.1 PATHWAY APPLICATION

A. Outdoors: Apply pathway products as specified below unless otherwise indicated:

1. Exposed Conduit: **GRC**.

2. Concealed Conduit, Aboveground: **GRC**, **EMT**, **RNC, Type EPC-40-PVC**.
3. Boxes and Enclosures, Aboveground: NEMA 250, **Type 3R**.

B. Indoors: Apply pathway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: **EMT**.
2. Exposed, Not Subject to Severe Physical Damage: **EMT**
3. Exposed and Subject to Severe Physical Damage: GRC.
4. Concealed in Ceilings and Interior Walls and Partitions: **EMT**
5. Damp or Wet Locations: GRC.
6. Pathways for Optical-Fiber or Communications Cable in Spaces Used for Environmental Air: **Plenum-type, optical-fiber-cable pathway**, **Plenum-type, communications-cable pathway, or EMT.**
7. Pathways for Concealed General-Purpose Distribution of Optical-Fiber or Communications Cable: **EMT**.
8. Boxes and Enclosures: NEMA 250 Type 1, except use NEMA 250 Type 4 **stainless steel** in institutional and commercial kitchens and damp or wet locations.

C. Minimum Pathway Size: 3/4-inch (21-mm) trade size. Minimum size for optical-fiber cables is 1 inch (27 mm).

D. Pathway Fittings: Compatible with pathways and suitable for use and location.

1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. EMT: Use **setscrew or compression**, **steel** or **cast-metal** fittings. Comply with NEMA FB 2.10.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

F. Install surface pathways only where indicated on Drawings.

G. Do not install nonmetallic conduit where ambient temperature exceeds **120 deg F (49 deg C)**.

3.2 INSTALLATION

A. Comply with NECA 1, NECA 101, and TIA-569 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum pathways. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.

B. Keep pathways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.

C. Arrange stub-ups so curved portions of bends are not visible above finished slab.

D. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches (300 mm) of changes in direction. Utilize long radius ells for all optical-fiber cables.

E. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

F. Stub-ups to Above Recessed Ceilings:

1. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

G. Coat field-cut threads on PVC-coated pathway with a corrosion-preventing conductive compound prior to assembly.

H. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.

I. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

J. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

K. Spare Pathways: Install pull wires in empty pathways. Cap underground pathways designated as spare above grade alongside pathways in use.

L. Surface Pathways:

1. Install surface pathway for surface telecommunications outlet boxes only where indicated on Drawings.

M. Pathways for Optical-Fiber and Communications Cable: Install pathways as follows:

1. 3/4-Inch (21-mm) Trade Size and Smaller: Install pathways in maximum lengths of 50 feet (15 m).
2. 1-Inch (27-mm) Trade Size and Larger: Install pathways in maximum lengths of 75 feet (23 m).
3. Install with a maximum of two 90-degree bends or equivalent for each length of pathway unless Drawings show stricter requirements.

N. Install pathway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound.

O. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service pathway enters a building or structure.
3. Where otherwise required by NFPA 70.

4. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
5. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
6. 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.

P. Mount boxes at heights indicated on Drawings in accordance with ADA requirements. Install boxes with height measured to **center** of box unless otherwise indicated.

Q. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR COMMUNICATIONS PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.4 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

3.5 PROTECTION

A. Protect coatings, finishes, and cabinets from damage or deterioration.

END OF SECTION 270528

SECTION 27 1100 - COMMUNICATIONS EQUIPMENT ROOM FITTINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Telecommunications mounting elements.
2. Backboards.
3. Telecommunications equipment racks and cabinets.
4. Grounding.

B. Related Requirements:
1. Section 271500 "Communications Horizontal Cabling" for voice and data cabling associated with system panels and devices.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For communications equipment room fittings. Include plans, elevations, sections, details, and attachments to other work.

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. Equipment Racks and Cabinets: Include workspace requirements and access for cable connections.
3. Grounding: Indicate location of grounding bus bar and its mounting detail showing standoff insulators and wall mounting brackets.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, qualified layout technician, installation supervisor, and field inspector.

1.4 QUALITY ASSURANCE

A. Installer Qualifications:

1. Layout Responsibility: Preparation of Shop Drawings shall be under the direct supervision of a Commercial Installer.
2. Installation Supervision: Installation shall be under the direct supervision of a BICSI Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.
3. Field Inspector: Currently registered by BICSI as RCDD to perform the on-site inspection.
4. Contractor shall be certified under Belden’s 25-year certification.

PART 2 - PRODUCTS

2.1 BACKBOARDS

A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm).

2.2 EQUIPMENT FRAMES

A. General Frame Requirements:

1. Distribution Frames: Freestanding and wall-mounting, modular-steel units designed for telecommunications terminal support and coordinated with dimensions of units to be supported.
2. Module Dimension: Width compatible with EIA 310-D standard, 19-inch (480-mm) panel mounting.
3. Finish: Manufacturer's standard, baked-polyester powder coat.

B. Floor-Mounted Racks: Modular-type, steel or aluminum construction.

1. Vertical and horizontal cable management channels, top and bottom cable troughs, grounding lug.
2. Baked-polyester powder coat finish.

C. Cable Management for Equipment Frames:

1. Metal, with integral wire retaining fingers.
2. Baked-polyester powder coat finish.
3. Vertical cable management panels shall have front and rear channels, with covers.
4. Provide horizontal crossover cable manager at the top of each relay rack, with a minimum height of two rack units each.

2.3 POWER STRIPS

A. Power Strips: Comply with UL 1363.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Rack mounting.
3. Six, 15-A, 120-V ac, NEMA WD 6, Configuration 5-15R receptacles.
4. LED indicator lights for power and protection status.
5. LED indicator lights for reverse polarity and open outlet ground.
6. Circuit Breaker and Thermal Fusing: When protection is lost, circuit opens and cannot be reset.
7. Circuit Breaker and Thermal Fusing: Unit continues to supply power if protection is lost.
8. Close-coupled, direct plug-in line cord.
9. Rocker-type on-off switch, illuminated when in on position.
10. Peak Single-Impulse Surge Current Rating: 33 kA per phase.
11. Protection modes shall be line to neutral, line to ground, and neutral to ground. UL 1449 clamping voltage for all three modes shall be not more than 330 V.

2.4 GROUNDING

A. Comply with requirements in Section 270526 "Grounding and Bonding for Communications Systems" for grounding conductors and connectors.

B. Telecommunications Main Bus Bar:

1. Refer to drawings for bus bar requirements.

C. Comply with J-STD-607-A.

2.5 LABELING

A. Comply with TIA 606 and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

PART 3 - EXECUTION

3.1 ENTRANCE FACILITIES

A. Contact telecommunications service provider and arrange for installation of demarcation point, protected entrance terminals, and a housing when so directed by service provider.

B. Comply with requirements in Section 270528 "Pathways for Communications Systems" for materials and installation requirements for underground pathways.

3.2 INSTALLATION

A. Comply with NECA 1.

B. Comply with BICSI TDMM for layout and installation of communications equipment rooms.

C. Bundle, lace, and train conductors and cables to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

D. Coordinate layout and installation of communications equipment with Owner's telecommunications and LAN equipment and service suppliers. Coordinate service entrance arrangement with local exchange carrier.

1. Meet jointly with telecommunications and LAN equipment suppliers, local exchange carrier representatives, and Owner to exchange information and agree on details of equipment arrangements and installation interfaces.
2. Record agreements reached in meetings and distribute them to other participants.
3. Adjust arrangements and locations of distribution frames, cross-connects, and patch panels in equipment rooms to accommodate and optimize arrangement and space requirements of telephone switch and LAN equipment.
4. Adjust arrangements and locations of equipment with distribution frames, cross-connects, and patch panels of cabling systems of other communications, electronic safety and security, and related systems that share space in the equipment room.

E. Coordinate location of power raceways and receptacles with locations of communications equipment requiring electrical power to operate.

3.3 SLEEVE AND SLEEVE SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.4 FIRESTOPPING

A. Comply with TIA-569, Annex A, "Firestopping."

B. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.5 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with J-STD-607-A.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 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.

1. Bond the shield of shielded cable to the grounding bus bar in communications rooms and spaces.

3.6 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA 606. Comply with requirements in Division 26.

B. Comply with requirements in Division 09 for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

C. Paint and label colors for equipment identification shall comply with TIA 606 for Class 2 level of administration.

D. Labels shall be preprinted or computer-printed type.

END OF SECTION 271100

SECTION 27 1300 - COMMUNICATIONS BACKBONE CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pathways.
2. UTP cable.
3. Cable connecting hardware, patch panels, and cross-connects.
4. Cabling identification products.

1.2 BACKBONE CABLING DESCRIPTION

A. Backbone cabling system shall provide interconnections between communications equipment rooms, main terminal space, and entrance facilities in the telecommunications cabling system structure. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection.

B. Backbone cabling cross-connects may be located in communications equipment rooms or at entrance facilities. Bridged taps and splitters shall not be used as part of backbone cabling.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Backbone cabling system shall comply with transmission standards in TIA 568, when tested according to test procedures of this standard.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:

1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
2. Cabling administration drawings and printouts.
3. Wiring diagrams to show typical wiring schematics including the following:

    a. Cross-connects.
    b. Patch panels.
    c. Patch cords.

4. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.
5. Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.

B. Source quality-control reports.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:

1. Layout Responsibility: Preparation of Shop Drawings by approved by a BICSI certified RCDD.
2. Installation Supervision: Installation shall be under the direct supervision of **a BICSI Level 2 Installer**, who shall be present at all times when Work of this Section is performed at Project site.
3. Contractor shall be certified under Belden's 25-year certification. Must contractor must be certified at least 6 months prior to bid.

B. 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: **50** or less.

C. 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.

D. Telecommunications Pathways and Spaces: Comply with TIA 569.

E. Grounding: Comply with ANSI-J-STD-607-A.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Test cables upon receipt at Project site. Test each pair of UTP cable for open and short circuits.

PART 2 - PRODUCTS

2.1 PATHWAYS

A. Cable Support: NRTL labeled for support of Category 6A cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.

1. Support brackets with cable tie slots for fastening cable ties to brackets.
2. Lacing bars, spools, J-hooks, and D-rings.
3. Straps and other devices.
4. Refer to 270536 for cable/ladder tray requirements.

B. Conduit and Boxes: Comply with requirements in Electrical Specifications.

2.2 BACKBOARDS

A. Backboards: Plywood, **fire-retardant treated,** 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm).

2.3 UTP CABLE

A. Description: 250-ohm, 4-pair UTP, formed into 12 cable groups covered with a **gray** thermoplastic jacket.

1. Comply with ICEA S-90-661 for mechanical properties.
2. Comply with TIA 568 for performance specifications.
3. Comply with TIA 568, **Category 6A**.
4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:

   a. Communications, General Purpose: Type CM or CMG**; or MPP, CMP, MPR, CMR, MP, or MPG**.
   b. Communications, Plenum Rated: Type CMP **or MPP**, complying with NFPA 262.
   c. Communications, Riser Rated: Type CMR**; or MPP, CMP, or MPR**, complying with UL 1666.

2.4 UTP CABLE HARDWARE

A. General Requirements for Cable Connecting Hardware: Comply with TIA 568, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.

B. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.

1. Number of Jacks per Field: One for each four-pair **conductor group of indicated cables, plus spares and blank positions adequate to suit specified expansion criteria**.

C. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.

D. Patch Cords: Factory-made, 4-pair cables in lengths as required by IT personnel; terminated with 8-position modular plug at each end.

1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6A performance. Patch cords shall have latch guards to protect against snagging.
2. Patch cords shall have color-coded boots for circuit identification.

2.5 GROUNDING

A. Comply with requirements in Section 270526 "Grounding and Bonding for Communications Systems" for grounding conductors and connectors.

B. Comply with ANSI-J-STD-607-A.

2.6 IDENTIFICATION PRODUCTS

A. Comply with TIA 606 and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

2.7 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate cables.

B. Factory test cables on reels according to TIA 568.

C. Factory test UTP cables according to TIA 568.

D. Cable will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 ENTRANCE FACILITIES

A. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

3.2 WIRING METHODS

A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters. Conceal raceway and cables except in unfinished spaces.

1. Install plenum cable in environmental air spaces, including plenum ceilings.
2. Comply with requirements for raceways and boxes specified in Electrical Specifications.

B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.3 INSTALLATION OF PATHWAYS

A. Cable Trays: Comply with NEMA VE 2 and TIA 569.

B. Comply with requirements for demarcation point, pathways, cabinets, and racks specified in Section 271100 "Communications Equipment Room Fittings." Drawings indicate general arrangement of pathways and fittings.

C. Comply with TIA 569 for pull-box sizing and length of conduit and number of bends between pull points.

D. Comply with requirements in Electrical Specifications for installation of conduits and wireways.

E. Install manufactured conduit sweeps and long-radius elbows whenever possible.

F. Pathway Installation in Communications Equipment Rooms:

1. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
2. Install cable trays to route cables if conduits cannot be located in these positions.
3. Secure conduits to backboard when entering room from overhead.
4. Extend conduits **3 inches (76 mm)** above finished floor.
5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

G. Backboards: Install backboards with 96-inch (2440-mm) dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.

3.4 INSTALLATION OF CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:

1. Comply with TIA 568.
2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
3. Install 110-style IDC termination hardware unless otherwise indicated.
4. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
5. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
6. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Use lacing bars and distribution spools.
8. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
9. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.

10. In the communications equipment room, install a 10-foot- (3-m-) long service loop on each end of cable.
11. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. UTP Cable Installation:

1. Comply with TIA 568.
2. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.

D. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend UTP cable not in a wireway or pathway, a minimum of 8 inches (200 mm) above ceilings by cable supports not more than **60 inches (1524 mm)** apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

E. Group connecting hardware for cables into separate logical fields.

F. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA 569 recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:

    a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
    b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
    c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (610 mm).

3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:

    a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
    b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
    c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).

4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:

    a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
    b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (76 mm).
    c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).

5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.5 FIRESTOPPING

A. Comply with TIA 569, Annex A, "Firestopping."

B. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.6 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with ANSI-J-STD-607-A.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 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.

3.7 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA 606. Comply with requirements for identification specified in Electrical Specifications.

1. Administration Class: **1**.
2. Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.

B. Comply with requirements in Division 09 for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

C. Paint and label colors for equipment identification shall comply with TIA 606 for Class 2 level of administration.

D. Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

E. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, **backbone pathways and cables,** terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors.

F. Cable and Wire Identification:

1. Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.

2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet (4.5 m).
4. Label each terminal strip and screw terminal in each cabinet, rack, or panel.

    a. Individually number wiring conductors connected to terminal strips and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device with name and number of particular device as shown.
    b. Label each unit and field within distribution racks and frames.

5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

G. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA 606, for the following:

1. Cables use flexible vinyl or polyester that flexes as cables are bent.

3.8 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Visually inspect UTP jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA 568.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. Test UTP copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.

    a. Test instruments shall meet or exceed applicable requirements in TIA 568. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

B. 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.

C. Remove and replace cabling where test results indicate that they do not comply with specified requirements.

D. Prepare test and inspection reports.

END OF SECTION 271300

SECTION 27 1500 - COMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. UTP cabling.
2. Cable connecting hardware, patch panels, and cross-connects.
3. Telecommunications outlet/connectors.
4. Cabling system identification products.

B. Related Requirements:

1. Section 271300 "Communications Backbone Cabling" for voice and data cabling associated with system panels and devices.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordinate layout and installation of telecommunications cabling with Owner's telecommunications and LAN equipment and service suppliers.

B. Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
2. Wiring diagrams to show typical wiring schematics, including the following:

   a. Cross-connects.
   b. Patch panels.
   c. Patch cords.

3. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.

B. Source quality-control reports.

C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications:

1. Layout Responsibility: Preparation of Shop Drawings by BICSI certified RCDD.
2. Installation Supervision: Installation shall be under the direct supervision of **a BICSI Level 2 Installer**, who shall be present at all times when Work of this Section is performed at Project site.
3. Contractor shall be certified under Belden's 25-year certification.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Test cables upon receipt at Project site. Test each pair of UTP cable for open and short circuits.

PART 2 - PRODUCTS

2.1 HORIZONTAL CABLING DESCRIPTION

A. Horizontal 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 568 requires that a minimum of two telecommunications outlet/connectors be installed for each work area.
2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications outlet/connector.
3. Bridged taps and splices shall not be installed in the horizontal cabling.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA 568 when tested according to test procedures of this standard.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing 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: **50** or less.

C. 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.

D. Grounding: Comply with J-STD-607-A.

2.3 BACKBOARDS

A. Backboards: Plywood, **fire-retardant treated,** 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm).

2.4 UTP CABLE

A. Description: 100-ohm, four-pair UTP, formed into 25-pair, binder groups covered with a blue thermoplastic jacket.

1. Comply with ICEA S-90-661 for mechanical properties.
2. Comply with TIA 568 for performance specifications.
3. Comply with TIA 568 **Category 6A**.
4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:

   a. Communications, General Purpose: Type CM or CMG.
   b. Communications, Plenum Rated: Type CMP complying with NFPA 262.
   c. Communications, Riser Rated: Type CMR, complying with UL 1666.

2.5 UTP CABLE HARDWARE

A. General Requirements for Cable Connecting Hardware: Comply with TIA 568, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.

B. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.

1. Number of Jacks per Field: **One** for each four-pair **conductor group of indicated cables, plus spares and blank positions adequate to suit specified expansion criteria**.

C. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.

D. Patch Cords: Factory-made, four-pair cables in lengths as required by IT personnel; terminated with eight-position modular plug at each end.

1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6A performance. Patch cords shall have latch guards to protect against snagging.
2. Patch cords shall have color-coded boots for circuit identification.

2.6 TELECOMMUNICATIONS OUTLET/CONNECTORS

A. Jacks: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA 568.

B. Workstation Outlets: **Two**-port-connector assemblies mounted in **multigang** faceplate.

1. Plastic Faceplate: High-impact plastic. Coordinate color with Electrical Specifications.
2. Metal Faceplate: **Stainless steel** complying with requirements in Electrical Specifications.
3. For use with snap-in jacks accommodating any combination of UTP work area cords.

    a. Flush mounting jacks, positioning the cord at a 45-degree angle.

4. Legend: Factory labeled by silk-screening or engraving **for stainless steel faceplates**.
5. Legend: Machine printed, in the field, using adhesive-tape label.
6. Legend: Snap-in, clear-label covers and machine-printed paper inserts.

2.7 GROUNDING

A. Comply with requirements in Section 270526 "Grounding and Bonding for Communications Systems" for grounding conductors and connectors.

B. Comply with J-STD-607-A.

2.8 IDENTIFICATION PRODUCTS

A. Comply with TIA 606 and UL 969 for labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

B. Comply with requirements in Electrical Specifications.

2.9 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate cables.

B. Factory test UTP cables on reels according to TIA 568.

C. Factory test UTP cables according to TIA 568.

D. Cable will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 ENTRANCE FACILITIES

A. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

3.2 WIRING METHODS

A. Install cables in pathways and cable trays except within consoles, cabinets, desks, and counters **and except in accessible ceiling spaces and in gypsum board partitions where**

unenclosed wiring method may be used. Conceal pathways and cables except in unfinished spaces.

1. Install plenum cable in environmental air spaces, including plenum ceilings.
2. Comply with requirements in Section 270528 "Pathways for Communications Systems."
3. Comply with requirements in Section 270536 "Cable Trays for Communications Systems."

B. Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

C. Wiring within Enclosures:

1. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
2. Install lacing bars and distribution spools.
3. Install conductors parallel with or at right angles to sides and back of enclosure.

3.3 INSTALLATION OF CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:

1. Comply with TIA 568.
2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
3. Install 110-style IDC termination hardware unless otherwise indicated.
4. MUTOA shall not be used as a cross-connect point.
5. Consolidation points may be used only for making a direct connection to telecommunications outlet/connectors:

    a. Do not use consolidation point as a cross-connect point, as a patch connection, or for direct connection to workstation equipment.
    b. Locate consolidation points for UTP at least 49 feet (15 m) from communications equipment room.

6. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
7. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
8. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
9. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
10. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
11. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
12. In the communications equipment room, install a 10-foot- (3-m-) long service loop on each end of cable.
13. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. UTP Cable Installation:

1. Comply with TIA 568.
2. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.

D. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend UTP cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than **60 inches (1524 mm)** apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

E. Group connecting hardware for cables into separate logical fields.

F. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA 569 for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:

   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (610 mm).

3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:

   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).

4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:

   a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (76 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).

5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.4 FIRESTOPPING

A. Comply with TIA 569, Annex A, "Firestopping."

B. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.5 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with J-STD-607-A.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 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.

3.6 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA 606. Comply with requirements for identification specified in Electrical Specifications.

1. Administration Class: **1**.
2. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.

B. Comply with requirements in Division 09 for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

C. Paint and label colors for equipment identification shall comply with TIA 606 for **Class 2** level of administration.

D. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

E. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, **backbone pathways and cables,** terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA 606. Furnish electronic record of all drawings, in software and format selected by Owner.

F. Cable and Wire Identification:

1. Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.

3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet (4.5 m).
4. Label each terminal strip and screw terminal in each cabinet, rack, or panel.

    a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
    b. Label each unit and field within distribution racks and frames.

5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

G. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA 606.

1. Cables use flexible vinyl or polyester that flex as cables are bent.

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Visually inspect UTP jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA 568.
2. Visually confirm **Category 6A,** marking of outlets, cover plates, outlet/connectors, and patch panels.
3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
4. Test UTP backbone copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.

    a. Test instruments shall meet or exceed applicable requirements in TIA 568. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

5. UTP Performance Tests:

    a. Test for each outlet and MUTOA. Perform the following tests according to TIA 568:

        1) Wire map.
        2) Length (physical vs. electrical, and length requirements).
        3) Insertion loss.
        4) Near-end crosstalk (NEXT) loss.
        5) Power sum near-end crosstalk (PSNEXT) loss.
        6) Equal-level far-end crosstalk (ELFEXT).
        7) Power sum equal-level far-end crosstalk (PSELFEXT).
        8) Return loss.
        9) Propagation delay.

10) Delay skew.

6. Final Verification Tests: Perform verification tests for UTP systems after the complete communications cabling and workstation outlet/connectors are installed.

   a. Voice Tests: These tests assume that dial tone service has been installed. Connect to the network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, make and receive a local, long distance, and digital subscription line telephone call.
   b. Data Tests: These tests assume the Information Technology Staff has a network installed and is available to assist with testing. Connect to the network interface device at the demarcation point. Log onto the network to ensure proper connection to the network.

B. Document data for each measurement. 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.

C. End-to-end cabling will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.8 DEMONSTRATION

A. **Train** Owner's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets.

END OF SECTION 271500

SECTION 28 31 00 - FIRE DETECTION AND ALARM SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled, intelligent reporting fire alarm equipment required to form a complete, operative, coordinated system. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, Fire Alarm Control Panels (FACP), auxiliary control devices, annunciators, and wiring as shown on the drawings and specified herein.

B. The fire alarm system shall comply with requirements of NFPA Standard 72 for Protected Premises Signaling Systems except as modified and supplemented by this specification. The system shall be electrically supervised and monitor the integrity of all conductors.

C. The FACP and peripheral devices shall be manufactured 100% by a single U.S. manufacturer matching the existing facility fire alarm system.

D. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing.

E. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site to guide the final checkout and to ensure the systems integrity.

F. The installing fire alarm contractor must maintain an office within 50 miles of the installation site.

1.2 SCOPE

A. The existing intelligent reporting, microprocessor-controlled fire detection system shall be extended to the new addition and installed in accordance to the project specifications and drawings.

B. Basic Performance:

1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on NFPA Style 4 (Class B) Signaling Line Circuits (SLC).
2. Initiation Device Circuits (IDC) shall be wired Class A (NFPA Style D) as part of an addressable device connected by the SLC Circuit.
3. Alarm signals arriving at the FACP shall not be lost following a primary power failure (or outage) until the alarm signal is processed and recorded.

C. BASIC SYSTEM FUNCTIONAL OPERATION
When a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:

1. The system alarm LED on the system display shall flash.
2. A local piezo electric signal in the control panel shall sound.
3. A backlit LCD display shall indicate all information associated with the fire alarm

condition, including the type of alarm point and its location within the protected premises.

4. History storage equipment shall log the information associated each new fire alarm control panel condition, along with time and date of occurrence.
5. All system output programs assigned via control-by-event interlock programming to be activated by the particular point in alarm shall be executed, and the associated system outputs (notification appliances and/or relays) shall be activated.

1.3 SUBMITTALS

A. General:

1. Five copies of all submittals shall be submitted to the Engineer for review.
2. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality. Equivalent compatible UL-listed equipment from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met.
3. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

B. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
3. Show annunciator layout, configurations, and terminations.

C. Manuals:

1. Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets.
2. Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.
3. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

D. Software Modifications

1. Provide the services of a factory trained and authorized technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 4 hours.

2. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site.

E. Certifications:
Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of the installation and the proposed performer of contract maintenance is an authorized representative of the major equipment

manufacturer. Include names and addresses in the certification.

1.4 GUARANTY:

All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one-year period shall be included in the submittal bid.

1.5 APPLICABLE STANDARDS AND SPECIFICATIONS:

The specifications and standards listed below form a part of this specification. The system shall fully comply with the latest issue of these standards, if applicable.

A. National Fire Protection Association (NFPA):

No. 72 National Fire Alarm Code
No. 101 Life Safety Code

B. Underwriters Laboratories Inc. (UL):

No. 268 Smoke Detectors for Fire Protective Signaling Systems
No. 86 Control Units for Fire Protective Signaling Systems
No. 268A Smoke Detectors for Duct Applications
No. 521 Heat Detectors for Fire Protective Signaling Systems
No. 464 Audible Signaling Appliances
No. 38 Manually Actuated Signaling Boxes
No. 346 Waterflow Indicators for Fire Protective Signaling Systems
No. 1971 Visual Notification Appliances

C. Local and State Building Codes.

D. All requirements of the Authority Having Jurisdiction (AHJ).

1.6 APPROVALS:

A. The system shall have proper listing and/or approval from the following nationally recognized agencies: UL - Underwriters Laboratories Inc

B. The fire alarm control panel shall meet UL Standard 864 Ninth Edition (Control Units)

1.7 APPROVED MANUFACTURERS:

A. Match existing facility manufacturer and provide compatible system and components. Existing system is Notifier by Honeywell NFS2-3030 and FireVoice 25/50 Voice Evacuation System.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIAL, GENERAL:

A. All equipment and components shall be new, and the manufacturer's current model. The

materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protective signaling system, meeting the National Fire Alarm Code.

B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

C. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

2.2 CONDUIT AND WIRE:

A. Conduit:

1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.
2. Where required, all wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
3. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760-55.
4. Wiring for 24 volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
5. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.

6. New conduit shall be 3/4-inch (19.1 mm) minimum except 120 volt AC may be run in ½ inch conduit. Where available, existing conduits may be used.

B. Wire:

1. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for Initiating Device Circuits and Signaling Line Circuits, and 14 AWG (1.63 mm) for Notification Appliance Circuits.
2. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
3. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NFPA 70 (e.g., FPLR).
4. Wiring used for the multiplex communication circuit (SLC) shall be twisted and unshielded and support a minimum wiring distance of 12,500 feet. The design of the system shall permit use of IDC and NAC wiring in the same conduit with the SLC communication circuit.
5. All field wiring shall be electrically supervised for open circuit and ground fault.

6. The fire alarm control panel shall be capable of t-tapping Class B (NFPA Style 4) Signaling Line Circuits (SLCs). Systems that do not allow or have restrictions in, for example, the amount of t-taps, length of t-taps etc., are not acceptable.

C. Terminal Boxes, Junction Boxes and Cabinets: All boxes and cabinets shall be UL listed for their use and purpose.

D. Initiating circuits shall be arranged to serve like categories (manual, smoke, waterflow). Mixed category circuitry shall not be permitted except on signaling line circuits connected to intelligent reporting devices.

2.3 FIRE ALARM CONTROL PANEL (One Required):

A. FACP or network node shall contain a microprocessor based Central Processing Unit (CPU) and power supply in an economical space saving single board design. The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors, addressable modules, printer, annunciators, and other system-controlled devices.

B. Operator Control

1. Acknowledge Switch:
   a. Activation of the control panel acknowledge switch in response to new alarms and/or troubles shall silence the local panel piezo electric signal and change the alarm and trouble LEDs from flashing mode to steady-ON mode. If multiple alarm or trouble conditions exist, depression of this switch shall advance the LCD display to the next alarm or trouble condition.
   b. Depression of the Acknowledge switch shall also silence all remote annunciator piezo sounders.
2. Alarm Silence Switch:
   Activation of the alarm silence switch shall cause all programmed alarm notification appliances and relays to return to the normal condition after an alarm condition. The selection of notification circuits and relays that are silenceable by this switch shall be fully field programmable within the confines of all applicable standards. The FACP software shall include silence inhibit and auto-silence timers.
3. Alarm Activate (Drill) Switch:
   The Alarm Activate switch shall activate all notification appliance circuits. The drill function shall latch until the panel is silenced or reset.
4. System Reset Switch:
   Activation of the System Reset switch shall cause all electronically-latched Initiating devices, appliances or software zones, as well as all associated output devices and circuits, to return to their normal condition.
5. Lamp Test:
   The Lamp Test switch shall activate all local system LEDs, light each segment of the liquid crystal display and display the panel software revision for service personal.

C. System Capacity and General Operation

1. The control panel or each network node shall provide or be capable of 318 intelligent/addressable devices.
2. The control panel or each network node shall include Form-C alarm, trouble, supervisory, and security relays rated at a minimum of 2.0 amps @ 30 VDC.
3. It shall also include four Class B (NFPA Style Y) or Class A (NFPA Style Z) programmable Notification Appliance Circuits.

4. The Notification Appliance Circuits shall be programmable to Synchronize with System Sensor, Gentex and Wheelock Notification Appliances.
5. The system shall include a full featured operator interface control and annunciation panel that shall include a backlit Liquid Crystal Display (LCD), individual color-coded system status LEDs, and an alphanumeric keypad with easy touch rubber keys for the field programming and control of the fire alarm system.
6. The system shall be programmable, configurable, and expandable in the field without the need for special tools, PROM programmers or PC based programmers. It shall not require replacement of memory ICs to facilitate programming changes.

7. The system shall allow the programming of any input to activate any output or group of outputs. Systems that have limited programming (such as general alarm), have complicated programming (such as a diode matrix), or require a laptop personal computer are not considered suitable substitutes.
8. The FACP shall support up to 20 logic equations, including "and," "or," and "not," or time delay equations to be used for advanced programming. Logic equations shall require the use of a PC with a software utility designed for programming.
9. The FACP or each network node shall provide the following features:
    a. Drift compensation to extend detector accuracy over life. Drift compensation shall also include a smoothing feature, allowing transient noise signals to be filtered out.
    b. Detector sensitivity test, meeting requirements of NFPA 72, Chapter 7.
    c. Maintenance alert, with two levels (maintenance alert/maintenance urgent), to warn of excessive smoke detector dirt or dust accumulation.
    d. Nine sensitivity levels for alarm, selected by detector. The alarm level range shall be .5 to 2.35 percent per foot for photoelectric detectors and 0.5 to 2.5 percent per foot for ionization detectors. The system shall also support sensitive advanced detection laser detectors with an alarm level range of .03 percent per foot to 1.0 percent per foot. The system shall also include up to nine levels of Prealarm, selected by detector, to indicate impending alarms to maintenance personnel.
    e. The ability to display or print system reports.
    f. Alarm verification, with counters and a trouble indication to alert maintenance personnel when a detector enters verification 20 times.
    g. PAS presignal, meeting NFPA 72 3-8.3 requirements.
    h. Rapid manual station reporting (under 3 seconds) and shall meet NFPA 72 Chapter 1 requirements for activation of notification circuits within 10 seconds of initiating device activation.
    i. Periodic detector test, conducted automatically by the software.
    j. Self-optimizing pre-alarm for advanced fire warning, which allows each detector to learn its particular environment and set its prealarm level to just above normal peaks.
    k. Cross zoning with the capability of counting: two detectors in alarm, two software zones in alarm, or one smoke detector and one thermal detector.
    l. Walk test, with a check for two detectors set to same address.
    m. Control-by-time for non-fire operations, with holiday schedules.
    n. Day/night automatic adjustment of detector sensitivity.
    o. Device blink control for sleeping areas.

10. The FACP shall be capable of coding main panel node notification circuits in March Time (120 PPM), Temporal (NFPA 72 A-2-2.2.2), and California Code. Panel notification circuits (NAC 1,2,3 and 4) shall also support Two-Stage operation, Canadian Dual Stage (3 minutes) and Canadian Dual Stage (5 minutes). Two stage operation shall allow 20 Pulses Per Minute (PPM) on alarm and 120 PPM after 5 minutes or when a second

device activates. Canadian Dual stage is the same as Two-Stage except will only switch to second stage by activation of Drill Switch 3 or 5-minute timer. The panel shall also provide a coding option that will synchronize specific strobe lights designed to accept a specific "sync pulse."

11. Network Communication
    The FACP shall be capable of communicating on a Fiber Optic Local Area Network (LAN), a firmware package that utilizes a peer-to-peer, inherently regenerative communication format and protocol.

D. Central Microprocessor

1. The microprocessor shall be a state-of-the-art, high speed, 16-bit RISC device and it shall communicate with, monitor and control all external interfaces. It shall include an EPROM for system program storage, Flash memory for building-specific program storage, and a "watch dog" timer circuit to detect and report microprocessor failure.
2. The microprocessor shall contain and execute all control-by-event programs for specific action to be taken if an alarm condition is detected by the system. Control-by-event equations shall be held in non-volatile programmable memory and shall not be lost even if system primary and secondary power failure occurs.
3. The microprocessor shall also provide a real-time clock for time annotation of system displays, printer, and history file. The time-of-day and date shall not be lost if system primary and secondary power supplies fail. The real time clock may also be used to control non-fire functions at programmed time-of-day, day-of-week, and day-of-year.
4. A special program check function shall be provided to detect common operator errors.
5. An auto-program (self-learn) function shall be provided to quickly install initial functions and make the system operational.
6. For flexibility and to ensure program validity, an optional Windows(TM) based program utility shall be available. This program shall be used to off-line program the system with batch upload/download and have the ability to upgrade the manufacturers (FLASH) system code changes. This program shall also have a verification utility, which scans the program files, identifying possible errors. It shall also have the ability to compare old program files to new ones, identifying differences in the two files to allow complete testing of any system operating changes. This shall be in incompliance with the NFPA 72 requirements for testing after system modification.

E. System Display

1. The system shall support an 80-character display. The display shall include an 80-character backlit alphanumeric Liquid Crystal Display (LCD) and a full PC style QWERTY keypad.
2. The display shall provide all the controls and indicators used by the system operator:
   a. The 80-character display shall include the following operator control switches: ACKNOWLEDGE, ALARM SILENCE, ALARM ACTIVATE (drill), SYSTEM RESET, and LAMP TEST.
3. The display shall annunciate status information and custom alphanumeric labels for all intelligent detectors, addressable modules, internal panel circuits, and software zones.
4. The display shall also provide Light-Emitting Diodes.
   a. The 80-character display shall provide 12 Light-Emitting-Diodes (LEDs), that indicate the status of the following system parameters: AC POWER, FIRE ALARM, PREALARM WARNING, SECURITY ALARM, SUPERVISORY SIGNAL, SYSTEM TROUBLE, DISABLED POINTS, ALARM SILENCED, Controls Active, Pre-Discharge, Discharge and Abort.
5. The display shall provide a QWERTY type keypad
   a. The 80-character display keypad shall be an easy to use QWERTY type keypad, similar to a PC keyboard. This shall be part of the standard system and have the

capability to command all system functions, entry of any alphabetic or numeric information, and field programming. Two different password levels shall be provided to prevent unauthorized system control or programming.

6. The system shall support the display of battery charging current and voltage on the 80-character LCD display.

F. Signaling Line Circuits (SLC)

1. Each FACP or FACP network node shall support one SLC. Each SLC interface shall provide power to and communicate with up to 159 intelligent detectors (ionization, photoelectric or thermal) and 159 intelligent modules (monitor or control) for a loop capacity of 318 devices. SLC shall be capable of NFPA 72 Style 4, Style 6, or Style 7 (Class A or B) wiring.
2. CPU shall receive analog information from all intelligent detectors to be processed to determine whether normal, alarm, prealarm, or trouble conditions exist for each detector. The software shall automatically maintain the detector's desired sensitivity level by adjusting for the effects of environmental factors, including the accumulation of dust in each detector. The analog information shall also be used for automatic detector testing and for the automatic determination of detector maintenance requirements.

G. Serial Interfaces

1. The system shall include two serial EIA-232 interfaces. Each interface shall be a means of connecting UL Listed Information Technology Equipment (ITE) peripherals.
   a. The EIA-485 interface may be used for network connection to a proprietary-receiving unit.

H. Enclosures:

1. The control panel shall be housed in a UL-listed cabinet suitable for surface or semi-flush mounting. The cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.

2. The back box and door shall be constructed of 0.060 steel with provisions for electrical conduit connections into the sides and top.
3. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators. For convenience, the door may be site configured for either right or left-hand hinging.

I. Power Supply:

1. A high tech off-line switching power supply shall be available for the fire alarm control panel or network node and provide 6.0 amps of available power for the control panel and peripheral devices.
2. Provisions will be made to allow the audio-visual power to be increased as required by adding modular expansion audio-visual power supplies.
3. Positive-Temperature-Coefficient (PTC) thermistors, circuit breakers, or other over-current protection shall be provided on all power outputs. The power supply shall provide an integral battery charger for use with batteries up to 55 AH or may be used with an external battery and charger system. Battery arrangement may be configured in the field.
4. The power supply shall continuously monitor all field wires for earth ground conditions, and shall have the following LED indicators:
   Ground Fault LED
   AC Power Fail LED
   NAC on LED (4)

5. The main power supply shall operate on 120 VAC, 60 Hz, and shall provide all necessary power for the FACP.
6. The main power supply shall provide a battery charger using dual-rate charging techniques for fast battery recharge and be capable of charging batteries up to 200 AH.
7. All circuits shall be power-limited, per UL864 requirements.

J. Auxiliary Field Power Supply - Addressable

1. The auxiliary addressable power supply is a remote 24 VDC power supply used to power Notification Devices and field devices that require regulated 24VDC power. The power supply shall also include and charge backup batteries.
2. The addressable power supply for the fire alarm system shall provide up a minimum of 6.0 amps of 24-volt DC regulated power for Notification Appliance Circuit (NAC) power or 5 amps of 24 volt DC general power. The power supply shall have an additional .5 amp of 24 VDC auxiliary power for use within the same cabinet as the power supply. It shall include an integral charger designed to charge 7.0 - 25.0 amp hour batteries.
3. The addressable power supply shall provide four individually addressable Notification Appliance Circuits that may be configured as two Class "A" and two Class "B" or four Class "B" only circuits. All circuits shall be power-limited per UL 864 requirements.
4. The addressable power supply shall provide built-in synchronization for certain Notification Appliances on each circuit without the need for additional synchronization modules. The power supply's output circuits shall be individually selected for synchronization. A single addressable power supply shall be capable of supporting both synchronized and non-synchronized Notification Devices at the same time.
5. The addressable power supply shall operate on 120 or 240 VAC, 50/60 Hz.
6. The interface to the power supply from the Fire Alarm Control Panel (FACP) shall be via the Signaling Line Circuit (SLC) or other multiplexed means Power supplies that do not use an intelligent interface are not suitable substitutes. The required wiring from the FACP to the addressable power supply shall be a single unshielded twisted pair wire. Data on the SLC shall be transmitted between 24 VDC, 5 VDC and 0 VDC at approximately 3.33k baud.
7. The addressable power supply shall supervise for battery charging failure, AC power loss, power brownout, battery failure, NAC loss, and optional ground fault detection. In the event of a trouble condition, the addressable power supply shall report the incident and the applicable address to the FACP via the SLC.
8. The addressable power supply shall have an AC Power Loss Delay option. If this option is utilized and the addressable power supply experiences an AC power loss, reporting of the incident to the FACP will be delayed. A delay time of eight or sixteen hours shall be Dip-switch selected.
9. The addressable power supply shall have an option for Canadian Trouble Reporting and this option shall be Dip-switch selectable.
10. The addressable power supply mounts in either the FACP backbox or it's own dedicated surface mounted backbox with cover.
11. Each of the power supply's four output circuits shall be DIP-switch selected for Notification Appliance Circuit or General Purpose 24 VDC power. Any output circuit shall be able to provide up to 2.5 amps of 24 VDC power.
12. The addressable power supply's output circuits shall be individually supervised when they are selected to be either a Notification Appliance Circuit when wired Class "A" or by the use of and end-of-line resistor. When the power supply's output circuit is selected as General 24VDC power, the circuit shall be individually supervised when an end-of-line relay is used.
13. When selected for Notification Appliance Circuits, the output circuits shall be individually DIP-switch selectable for Steady, March Time, Dual Stage or Temporal.
14. When selected as a Notification Appliance Circuit, the output circuits of the addressable power supply shall have the option to be coded by the use of a universal zone coder.

15. The addressable power supply shall interface and synchronize with other power supplies of the same type. The required wiring to interface multiple addressable power supplies shall be a single unshielded, twisted pair wire.
16. An individual or multiple interfaced addressable power supplies shall have the option to use an external charger for battery charging. Interfaced power supplies shall have the option to share backup battery power.

K. Specific System Operations

1. Smoke Detector Sensitivity Adjust: A means shall be provided for adjusting the sensitivity of any or all addressable intelligent detectors in the system from the system keypad. Sensitivity range shall be within the allowed UL window and have a minimum of 9 levels.
2. Alarm Verification: Each of the intelligent addressable smoke detectors in the system may be independently selected and enabled to be an alarm verified detector. The alarm verification delay shall be programmable from 5 to 30 seconds and each detector shall be able to be selected for verification. The FACP shall keep a count of the number of times that each detector has entered the verification cycle. These counters may be displayed and reset by the proper operator commands.
3. Point Disable: Any addressable device or conventional circuit in the system may be enabled or disabled through the system keypad.
4. Point Read: The system shall be able to display or print the following point status diagnostic functions:
   a. Device status
   b. Device type
   c. Custom device label
   d. View analog detector values
   e. Device zone assignments
   f. All program parameters
5. System Status Reports: Upon command from an operator of the system, a status report will be generated and printed, listing all system status.
6. System History Recording and Reporting: The fire alarm control panel shall contain a history buffer that will be capable of storing up to 800 events. Up to 200 events shall be dedicated to alarm and the remaining events are general purpose. Systems that do not have dedicated alarm storage, where events are overridden by non-alarm type events, are not suitable substitutes. Each of these activations will be stored and time and date stamped with the actual time of the activation. The contents of the history buffer may be manually reviewed, one event at a time, or printed in its entirety. The history buffer shall use non-volatile memory. Systems that use volatile memory for history storage are not acceptable substitutes.
7. Automatic Detector Maintenance Alert: The fire alarm control panel shall automatically interrogate each intelligent detector and shall analyze the detector responses over a period of time. If any intelligent detector in the system responds with a reading that is above or below normal limits, then the system will enter the trouble mode, and the particular detector will be annunciated on the system display, and printed on the optional printer. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.
8. Pre-Alarm Function: The system shall provide two levels of pre-alarm warning to give advance notice of a possible fire situation. Both pre-alarm levels shall be fully field adjustable. The first level shall give an audible indication at the panel. The second level shall give an audible indication and may also activate control relays. The system shall also have the ability to activate local detector sounder bases at the pre-alarm level, to assist in avoiding nuisance alarms.
9. Software Zones: The FACP shall provide 100 software zones, 10 additional special function zones, 10 releasing zones, and 20 logic zones.

10. The fire alarm control panel shall include a walk test feature. It shall include the ability to test initiating device circuits and notification appliance circuits from the field without returning to the panel to reset the system. Operation shall be as follows:
    a. Alarming an initiating device shall activate programmed outputs, which are selected to participate in walk test, for 3 seconds.
    b. Introducing a trouble into the initiating device shall activate the programmed outputs for 8 seconds.
    c. All devices tested in walk test shall be recorded in the history buffer.
11. Waterflow Operation
    An alarm from a waterflow detection device shall activate the appropriate alarm message on the main panel display, turn on all programmed notification appliance circuits and shall not be affected by the signal silence switch.
12. Supervisory Operation
    An alarm from a supervisory device shall cause the appropriate indication on the system display, light a common supervisory LED, but will not cause the system to enter the trouble mode.
13. Signal Silence Operation
    The FACP shall have the ability to program each output circuit (notification, relay, speaker etc) to deactivate upon depression of the signal silence switch.
14. Non-Alarm Input Operation
    Any addressable initiating device in the system may be used as a non-alarm input to monitor normally open contact type devices. Non-alarm functions are a lower priority than fire alarm initiating devices.
15. Combo Zone
    A special type code shall be available to allow waterflow and supervisory devices to share a common addressable module. Waterflow devices shall be wired in parallel, supervisory devices in series.

2.5 SYSTEM COMPONENTS - ADDRESSABLE DEVICES

A. Addressable Devices – General

1. Addressable devices shall use simple to install and maintain decade, decimal address switches. Devices shall be capable of being set to an address in a range of 001 to 159.
2. Addressable devices, which use a binary-coded address setting method, such as a DIP-switch, are not an allowable substitute.
3. Detectors shall be intelligent (analog) and addressable and shall connect with two wires to the fire alarm control panel Signaling Line Circuits.
4. Addressable smoke and thermal detectors shall provide dual alarm and power/polling LEDs. Both LEDs shall flash green under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady red illumination by the control panel, indicating that an alarm condition has been detected. If required, the LED flash shall have the ability to be removed from the system program. An output connection shall also be provided in the base to connect an external remote alarm LED.
5. The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system. The panel on a time-of-day basis shall automatically adjust sensitivity.
6. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 7.
7. The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature. Bases shall include a sounder base with a built-in (local) sounder

rated at 85 DBA minimum, a relay base and an isolator base designed for Style 7 applications.

8. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.
9. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).
10. Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector.
11. Addressable devices shall store an internal identifying code that the control panel shall use to identify the type of device.
12. A magnetic test switch shall be provided to test detectors and modules. Detectors shall report an indication of an analog value reaching 100% of the alarm threshold.
13. Addressable modules shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box. An optional surface mount Lexan enclosure shall be available.

B. Addressable Manual Fire Alarm Box (manual station)

1. Addressable manual fire alarm boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.
2. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.
3. Manual fire alarm boxes shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches (44 mm) or larger.

C. Intelligent Multi Criteria Acclimating Detector

1. The intelligent multi criteria Acclimate detector shall be an addressable device that is designed to monitor a minimum of photoelectric and thermal technologies in a single sensing device. The design shall include the ability to adapt to its environment by utilizing a built-in microprocessor to determine it's environment and choose the appropriate sensing settings. The detector design shall allow a wide sensitivity window, no less than 1 to 4% per foot obscuration. This detector shall utilize advanced electronics that react to slow smoldering fires and thermal properties all within a single sensing device.
2. The microprocessor design shall be capable of selecting the appropriate sensitivity levels based on the environment type it is in (office, manufacturing, kitchen etc.) and then have the ability to automatically change the setting as the environment changes (as walls are moved or as the occupancy changes).
3. The intelligent multi criteria detection device shall include the ability to combine the signal of the thermal sensor with the signal of the photoelectric signal in an effort to react hastily in the event of a fire situation. It shall also include the inherent ability to distinguish between a fire condition and a false alarm condition by examining the characteristics of the thermal and smoke sensing chambers and comparing them to a database of actual fire and deceptive phenomena.

D. Intelligent Thermal Detectors

1. Thermal detectors shall be intelligent addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. It shall connect via two wires to the fire alarm control panel signaling line circuit.

E. Intelligent Duct Smoke Detector

1. The smoke detector housing shall accommodate either an intelligent ionization detector or an intelligent photoelectric detector, of that provides continuous analog monitoring and alarm verification from the panel.
2. When sufficient smoke is sensed, an alarm signal is initiated at the FACP, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system.

F. Addressable Dry Contact Monitor Module

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to one of the fire alarm control panel SLCs.
2. The IDC zone shall be suitable for Style D or Style B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
3. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4-inch (70 mm) x 1-1/4 inch (31.7 mm) x 1/2 inch (12.7 mm). This version need not include Style D or an LED.

G. Addressable Relay Module

1. Addressable Relay Modules shall be available for HVAC control and other building functions. The relay shall be form C and rated for a minimum of 2.0 Amps resistive or 1.0 Amps inductive. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to ensure that 100% of all auxiliary relay or NACs may be energized at the same time on the same pair of wires.

2.6 BATTERIES:

A. The battery shall have sufficient capacity to power the fire alarm system for not less than twenty-four hours plus 5 minutes of alarm upon a normal AC power failure.

B. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required.

C. If necessary to meet standby requirements, external battery and charger systems may be used.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on

the drawings, and as recommended by the major equipment manufacturer.

B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

C. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

D. Manual fire alarm boxes shall be suitable for surface mounting or semi-flush mounting as shown on the plans and shall be installed not less than 42 inches (1067 mm), nor more than 48 inches (122 mm) above the finished floor.

3.2 TEST: The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72, Chapter 7.

A. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

B. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.

C. Verify activation of all waterflow switches.

D. Open initiating device circuits and verify that the trouble signal actuates.

E. Open and short signaling line circuits and verify that the trouble signal actuates.

F. Open and short notification appliance circuits and verify that trouble signal actuates.

G. Ground all circuits and verify response of trouble signals.

H. Check presence and audibility of tone at all alarm notification devices.

I. Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.

J. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

K. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

3.3 FINAL INSPECTION:

A. At the final inspection, a factory-trained representative of the manufacturer of the major equipment shall demonstrate that the system functions properly in every respect.

3.4 INSTRUCTION:

A. Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

B. The contractor and/or the systems manufacturer's representatives shall provide a typewritten "Sequence of Operation."

END OF SECTION

SECTION 313116 - TERMITE CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Soil treatment.

1.2 ACTION SUBMITTALS

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Soil Treatment Application Report: Include the following:

1. Date and time of application.
2. Moisture content of soil before application.
3. Termiticide brand name and manufacturer.
4. Quantity of undiluted termiticide used.
5. Dilutions, methods, volumes used, and rates of application.
6. Areas of application.
7. Water source for application.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located and who employs workers trained and approved by manufacturer to install manufacturer's products.

1.5 WARRANTY

A. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work consisting of applied soil termiticide treatment will prevent infestation of subterranean termites, including Formosan termites (Coptotermes formosanus). If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

1. Warranty Period:Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT

A. Termiticide: EPA-Registered termiticide acceptable to authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation.

1. Service Life of Treatment: Soil treatment termiticide that is effective for not less than five years against infestation of subterranean termites.

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove extraneous sources of wood cellulose and other edible materials, such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated.

3.2 APPLYING SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Distribute treatment uniformly. Apply treatment at the product's EPA-Registered Label volume and rate for maximum specified concentration of termiticide to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction.

1. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
2. Foundations: Soil adjacent to and along the entire inside perimeter of foundation walls; along both sides of interior partition walls; around plumbing pipes and electric conduit penetrating the slab; around interior column footers, piers, and chimney bases; and along the entire outside perimeter, from grade to bottom of footing.
3. Masonry: Treat voids.
4. Penetrations: At expansion joints, control joints, and areas where slabs and below-grade walls will be penetrated.

B. Post warning signs in areas of application.

C. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION

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TERMINAL BAGGAGE MAKEUP EXPANSION

BHS SPECIFICATION

Permit Documents

May 10, 2022

Version	Description of Version or Revisions made	Date
0.0	Initial Submittal	3/25/2022
1.0	Bid Documents	4/6/2022
1.1	Permit Documents (no changes from Bid)	5/10/2022

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1 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 PROJECT OVERVIEW

1.2.1 General

The existing baggage handling system design is a typical “in-line” screening system with one (1) slope plate makeup system. Level 1 (EDS) screened and cleared bags (CL1/CL2) merge and are transported to the baggage makeup room. Level 2 (OSR) and Level 3 (CBRA) cleared bags are merged and transported to the baggage makeup (CL3/CL4). The preferred alternative design was selected based on a number of criteria. This design features two (2) slope plate claim devices (one existing) and a new claim feed system that merges all cleared bags from the screening matrix, then reads the bag tags and routes them to a specific claim unit based on carrier. This specification and drawings comprise the baggage handling portion of the overall project.

<u>Description of Operation:</u>

Cleared bags from the screening machines merge onto the existing CL2 line which becomes the new CL2 conveyor line at a door entering the makeup room. A second cleared-bag line, transporting CBRA and OSR-cleared bags, becomes the new CL3 conveyor at a door entering the makeup room. The new CL3 conveyor line merges onto the new CL2 conveyor line creating single merged flow of cleared bags, just prior to the automatic tag reader (ATR).

Bag tags are read by the ATR and stored by the BHS control system. From this point to the second diverter, bags will be tracked with the carrier information read at the ATR. Bags that are read as Southwest Airlines (SWA) will be diverted to the new MF2 makeup feed line and transported to the new MU2 slope-plate makeup device. Bags that are read as any other airline (DL, UL, AA) will be diverted to the new MF1 makeup feed line and transported to the existing MU1 slope-plate makeup device.

Automatic tag readers generally have high successful read rates, however there will be instances where a tag will not be read by the scanner as it passes through due to various reasons. Also, bags may (infrequently) become lost in tracking after they are read by the ATR and then cannot be properly routed. No-read and lost-in-tracking bags will not be diverted to either MU1 or MU2 but will proceed on CL2 to the NR1 no-read runout pier. Bags will index onto the runout unloading belt which is programmed to stop to maximize storage capacity. The runout unload belt is located just outside of the makeup building at a location that all tuggers will pass by on their way to the ramp.

An operator interface will be provided as an addition to the current maintenance diagnostic system (MDS), and/or as a stand-alone touch screen in the makeup room. The interface will allow sort parameters to be assigned, such as the allocation table of airlines to makeup carousels. The operator interface will also provide overrides and defaults to control the routing behavior when parts of the sort system are faulted or rendered unavailable.

1.2.2 Project Scope Overview

1.2.2.1 Outbound Baggage System Upgrade Work

a) The BHS contractor shall provide all work associated with the temporary screening operation. (TBD).

b) Demolition of required existing outbound conveyors shall be the responsibility of the BHS contractor. The existing outbound BHS consists of two (2) clear line makeup conveyors. Catwalks will need to be removed and can potentially be reconfigured for the new system.

c) For Demolished conveyors, remove all related electrical filed wring, devices, and conduit back to the associated MCP. Remove all related PLC programming and upper level (MIS/MDS) graphics and reports elements associated with demolished conveyors. Ensure that all electrical and software removal activities do not affect airport operations.

d) The contractor shall notify ECP prior to removal of components from site for their consideration in keeping components for spares. ECP will notify the contractor within two (2) days of review of the equipment for components to be discarded versus retained by ECP.

e) The BHS contractor shall manufacture and install the new makeup feeds as shown on the contract drawings. This system consists of:

1. One (1) slope plate makeup device and two (2) makeup feeds.
2. Two (2) clear lines, one (1) ATR, two (2) high speed diverters and one (1) no-read line.
3. Catwalks and walkovers.

f) Provide a new MCP for the control of all new conveyors, ATRs, doors and diverter associated with this project. Provide all related power and control wiring with associated conduits from the BHS related normal Power Distribution Panels to the new Motor Control Panels and onto their subsystem conveyor segment(s) field equipment/components for the conveyors and devices defined in the contract documents.

g) Update all related PLC programming and related upper level (MIS/MDS) graphics and reports elements associated with new conveyors. Provide an

operator interface in the upper level software to change the sortation assignments.

1.3 RELATED DOCUMENTS

1.3.1 General

a) Applicable provisions of the contract, including conditions of the contract, Architect/Engineering Drawings and all General Requirements of the contract apply to this specification.

b) In the event any related documents, including specifications, drawings, codes and regulations conflict with each other, the BHS contractor shall notify the Owner (or OAR) of the discrepancy in writing. The Owner (or OAR) shall then advise the BHS contractor as to which document shall govern. Until the conflict is resolved, the most stringent resolution shall be followed.

1.3.2 Contract Drawings

a) Refer to Index Sheet of the contract drawing set for a list of all applicable drawings.

1.3.3 Existing Documentation and Information.

a) Information regarding existing conveyor equipment designated for modification or to remain, such as but not limited to: Mechanical and Electrical as-built documents/information, O&M manuals, computer/PLC architecture and layout drawings/documents, PLC/computer software and source codes along with other relative documentation relating to the existing BHS shall be obtained from the Owner (or OAR) if available.

b) Contact the Owner (or OAR) and request the necessary documents, existing software and source codes that would be required for the system alterations/additions, and for coordination and reference purposes, between the existing systems and the specified BHS Project (additions and/or modifications).

c) The BHS contractor may also make arrangements to search the Owner's library of “Record Documents” for drawings, manuals, and other applicable information that may be relevant to the Project.

d) The Owner makes no guarantees regarding the accuracy or completeness of the files in their library. It is the BHS contractor's responsibility to verify all information gathered from that source.

e) If As-built documentation is not available, the BHS contractor shall engage the necessary staff to obtain the needed information on the existing conveyor systems and equipment, via site survey.

f) The BHS contractor is responsible for submitting complete and comprehensive Project documentation for this work during the drawing submittal phases. Any

pertinent information or documentation that is not available from the Owner's records shall be generated by the BHS contractor in compliance with the Owner's or Owner's Authorized Representative's (OAR's) documentation standards.

1.3.4 Special Related Documents

a) Planning Guidelines and Design Standards (PGDS v7) for Checked Baggage Inspection Systems for all requirements.

b) Site Specific Test Plan (SSTP) for the Checked Baggage Inspection System (CBIS) Performance and Commissioning Requirements. The SSTP document for the project will be generated by the BHS contractor, consistent with the PGDS v7, Appendix D (Commissioning and Evaluation) requirements, and will be submitted to, and approved by, TSA prior to the any acceptance testing. It is the responsibility of the BHS contractor to provide the SSTP document and test forms at the time of testing.

1.3.5 Other Documentation

a) The BHS contractor shall obtain and comply with all applicable codes and regulations having jurisdiction for the Project.

b) BHS contractor shall obtain necessary documentation and coordinate their work with the work performed by "Others".

1.4 GENERAL INFORMATION

1.4.1 Project Documents

a) The BHS minimum requirements for this Project are provided in the Contract Drawings, Documents, and Specifications.

b) The contract documents, drawings and specifications for this Project are for "Intents and Purposes" and are not to be interpreted as being complete and completely accurate in every aspect. The BHS contractor shall not copy or distribute or disclose its contents without the written consent of the Owner (or OAR).

c) These specifications are performance based standards for a complete, fully functioning, Baggage Handling System (BHS).

d) The Owner or the Owner's Authorized Representative (OAR) does not guarantee the accuracy of the documentation for the status of the Airport facilities, the utility services, existing conditions, clearances and/or structural information.

e) The BHS contractor shall adhere to the Contract Drawings, documents and specifications and shall not exploit any discrepancy, error or omission.

f) If there are any discrepancies between these specifications, the Contract Drawings, and/or documents, the more stringent requirement shall apply. This includes discrepancies between the contract documents and any applicable

Federal, State or Local codes and TSA “Planning Guidelines & Design Standards” (PGDS) (latest version).

1.4.2 Contractor Responsibilities

a) The design and construction of the new BHS work is subject to the approval of the Airport Authority (Owner) and shall meet or exceed all TSA PGDS (latest version) requirements where applicable.

b) The scope of work includes coordination with TSA’s 3rd party vendors and consultants that shall interface with the BHS.

c) The project shall be phased to prevent disruption of existing and new Airport operations.

d) The BHS contractor shall verify the dimensions and confirm quantities of the materials and equipment before the preparation and submittal of applicable drawings.

e) The BHS contractor shall be responsible for field verifying and confirming all the existing conditions (including Mechanical, Electrical, and Plumbing (MEP), architectural, structural and phasing) that shall impact the scope of work.

f) The BHS contractor shall coordinate the final BHS equipment locations with Mechanical, Electrical and Plumbing (MEP).

g) The BHS equipment shall be laid out before the installation (so that all other associated trades may install their equipment and components in the spaces available).

h) Provide coordination for the BHS equipment installation in a professional and efficient manner.

i) The submission of a bid for this work shall serve as the BHS contractor’s certification that the systems and components comply with the Owners requirements.

j) The BHS contractor shall prepare (in written form) the functional description and integration documents, to be submitted and reviewed by the Owner, or the Owner’s Authorized Representative (OAR).

k) The BHS contractor shall provide all the labor, materials and facilities, and shall execute all the tasks associated with this project, including design, engineering, and all related work for a complete operational BHS that is accepted, and approved by the Owner (or OAR).

l) All BHS equipment, parts or material provided by the BHS contractor to be equal to those specified are subject to approval by the Owner (or OAR), utilizing the RFI and RFS process.

m) The BHS contractor shall provide all the required notices, file all plans, pay all fees, and obtain all the permits and approvals (from the authorities having

jurisdiction). All required fees and taxes (Federal, State, and Local) shall be included in the bid price.

n) The BHS contractor shall be responsible for all of their employee security badges, as required by the Airport Authority. The Owner (or OAR) shall not provide escort services for any BHS employees on the Airline Ticket Offices (ATO) and Airport Operations Area (AOA) side of the facility.

o) The BHS contractor shall provide the temporary power and lighting required for the installation and testing of the BHS.

p) Refer to procurement documents, the bid form and other specification sections for the “Buy American” certifications and compliance requirements.

q) All of the BHS contractor’s employees shall be US citizens or legal permanent residents of the United States.

1.4.3 BHS Permits

a) The General Construction Permit covering the BHS installation shall be provided “by others”.

b) All other applicable electrical permits, licenses, etc., shall be obtained and paid for by the BHS contractor.

c) A copy of the permits and inspections shall be provided by the BHS contractor and shall be submitted to the Owner (or OAR).

d) The BHS contractor shall not perform any associated work prior to posting an “executed and approved” copy of the permit in a visible location (at the site of the work), if applicable.

e) The permit shall not give authority to violate or cancel the provisions of these standards and codes. The permit shall not be construed as an approval of any violation of the provisions of the Airport Construction and Fire Prevention Standards or Codes.

f) The permit shall not prevent the Building Official or Fire Chief from thereafter requiring the correction of errors, or from preventing building operations being carried on, when in violation of the referenced Standards and Codes.

g) The permit applicant shall comply with all the Federal, State and Local laws, statutes, orders and regulations as may be legally applicable to the work that shall be performed under the permit. The permit applicant shall protect the lives and health of the public and fully comply with all safety standards (required by the Federal, State and Local laws).

1.5 DEFINITIONS

1.5.1 General

a) “As Built” shall mean everything associated with the Project has been field verified and documented.

b) “Baggage Handling System” shall include but is not limited to the following:

1. All components for a fully operational, Owner approved and accepted system.
2. Interfaces
3. Hardware
4. Software and documentation
5. Installation materials
6. Installation
7. Coordination
8. Construction supervision
9. Computers
10. Peripheral devices
11. MCPs
12. PLCs and/or HMIs
13. Fire/Security doors
14. Controls
15. Control hardware
16. Control software
17. Management and support services

c) “Contractor” shall mean a firm or person or other such entity that may be contracted by the Owner (or OAR) for the purpose of managing the contract.

d) “Others” shall mean a firm or person, separate from the BHS contractor, who shall enter (or has entered) into a separate contract with the Owner (or OAR).

e) “Baggage Handling System contractor” (BHS contractor) shall mean the firm or company responsible for the design, engineering, manufacture, integration, installation, programming, testing and commissioning of the conveyor systems and associated equipment.

f) “Control System” shall mean the equipment and methods of controlling all of the associated baggage conveyors, equipment and devices in the BHS.

g) “Specifications” shall mean the requirements for the work included in the contract and any revision of such specification thereafter.

h) “The Contract Drawings” shall mean the drawings referred to in these written specifications or the contract. The Owner may supply revisions of those drawings and other drawings to the BHS contractor for the purposes of the Contract.

i) “Contract” shall mean the written agreement between the Owner and the BHS contractor for the performance of the works, including all schedules, attachments, annexure and other documents incorporated into this Contract, as specified.

j) “Subsystem” shall mean a set of baggage conveyor segments and its related field elements (MCP, control stations, photoeyes, encoders, etc.), which is

functional, geographical or control system subdivision, and a part of the whole system

k) “Site” shall mean the Project work area made available (or to be made available) to the BHS contractor by the Owner (or OAR), for the purpose of the Contract and/or Work.

l) “Temporary Work” shall mean any work that is required for the execution of the contract, but not forming part of the final work.

m) “The Works” shall mean the whole Project obligation shall be executed in accordance with the Contract, including variations, provided for by the Contract.

n) “Work” under the Contract shall mean any and all work that the BHS contractor is, (or may be), required to execute per the Contract, including variations, remedial work and temporary work.

o) “Completion” shall mean the stage of the execution of the work under the contract when all other associated things are completed, performed and accepted.

p) “Cold Back-up” - shall mean redundancy based on the removal of a failed primary component and replacement with a fully programmed component.

q) “Public Areas” – shall mean any area that the general public (passengers, visitors, tourists, etc.) has unrestricted access to.

r) In these Specifications and on the Contract Drawings and/or Documentation the following clarifications/definitions shall apply:

1. Words indicating the singular include plural and words importing the plural include the singular.
2. Words indicating persons include a partnership and a body corporate.
3. Words indicating the masculine gender also include the feminine gender.

1.5.2 Abbreviations

1. ACS - Access Control System
2. ANSI - American National Standards Institute
3. AL – Alarm Line
4. AOA - Airport Operations Area
5. ATO - Airline Ticket Office
6. AWS – American Welding Society
7. BHS - Baggage Handling System
8. BHSC - Baggage Handling System Contractor
9. BIT – Baggage Inspection Table
10. BPH – Bags Per Hour
11. BRP – Baggage Removal Point
12. BSD – Bag Status Display
13. BVS - Baggage Viewing Stations

14. CB - Clear Bag
15. CBIS - Checked Baggage Inspection System
16. CBRA – Checked Baggage Resolution Area
17. CCTV – Closed Circuit Television
18. CEMA - Conveyor Equipment Manufacturers Association
19. COR - Change Order Request
20. CT - Computed Tomography
21. DHS – Department of Homeland Security
22. EDS - Explosive Detection System
23. ETD - Explosive Trace Detection
24. FAA - Federal Aviation Administration
25. FAT - Factory Acceptance Test
26. FF&E – Furniture, Fixtures, and Equipment
27. FIDS – Flight Information Display System
28. FIS – Federal Inspection Services
29. FLA - Full Load Amperage
30. FPM - Feet Per Minute
31. GC - General Contractor
32. GSE - Ground Service Equipment
33. HMI - Human Machine Interface
34. HVAC - Heating, Ventilating and Air Conditioning
35. IATA - International Airline Transportation Association
36. ID - Identification
37. IEC - International Electromechanical Commission
38. I/O - Input/Output
39. ILDT – Integrated Local Design Team
40. IQ - Image Quality
41. IQT – Image Quality Test
42. IQTK – Image Quality Test Kit
43. IRD – Interface Requirements Document
44. ISD – In-line Screening Device
45. IT – Information Technology
46. LAN - Local Area Network
47. LEO – Law Enforcement Officer
48. LOI – Letter Of Intent
49. MCP - Motor Control Panel
50. MDS – Maintenance Diagnostic System
51. MEP - Mechanical, Electrical and Plumbing System
52. MTBF - Mean Time Between Failures
53. NEC - National Electrical Code
54. NEMA - National Electrical Manufacturers' Association
55. NFPA - National Fire Protection Association
56. NIC - Not In Contract
57. NTP - Notice to Proceed

58. OAR - Owner Assigned Representative
59. O&M - Operations and Maintenance
60. OEM - Original Equipment Manufacturer
61. OIT - Operator Interface Terminal
62. OOG - Out of Gauge
63. OS - Oversized
64. OSARP – On Screen Alarm Resolution (Protocol) or (Process)
65. OSHA - Occupational Safety and Health Administration
66. OSR - On-Screen Resolution
67. OWNER – Airport Authority
68. P/N - Part Number
69. PAX - Passenger
70. PDP - Power Distribution Point (Panel) (Pole)
71. PE - Professional Engineer
72. PEC - Photo Electric Cell
73. PGDS - Planning Guidelines and Design Standards (latest version)
74. PLC - Programmable Logic Controller (or Computer)
75. PM - Program (Project) Manager
76. PT – Power Turn
77. QA - Quality Assurance
78. QAR - Quality Assurance Report
79. RFI -Request For Information
80. RFS -Request For Substitution
81. ROM – Rough Order of Magnitude
82. ROW - Right of Way
83. SACR – Security Access Card Reader
84. SAT - Site Acceptance Testing
85. SB - Suspect Bag
86. SF – Security Feed conveyor line
87. SIDA – Security Identification Display Area
88. SOP – Standard Operating Procedures
89. SS – Security Shunt conveyor line
90. SSI – Sensitive Security Information
91. SVS – Secondary Viewing Station
92. SWS – Search Work Station
93. TBD – To Be Determined
94. TCU - Threat Containment Unit
95. TEFC – Totally Enclosed Fan Cooled
96. TIM – Technical Interface Meeting
97. TIR – Total Indicator Runout
98. TOB - Top of Belt
99. TR – Transfer Conveyor Line
100. TSA - Transportation Security Administration
101. UHMW – Ultra High Molecular Weight

102. UL - Underwriters Laboratories
103. UPS - Uninterrupted Power Supply
104. VFD - Variable Frequency Drive

1.6 BHS CODES AND STANDARDS

1.6.1 Reference Codes

a) The design and subsequent installation shall provide adequate safety factors and shall conform to all current standards and codes of the USA, State, City and Airport (whichever is more stringent).

b) Reference to the codes and standards form part of this specification to the same extent as if bound herein.

c) All work shall be in accordance with the latest applicable federal, state and municipal building codes.

1. State Building Code
2. National Electrical Code (NEC)
3. International Fuel Gas Code (IFGC)
4. ICC-2003 / ANSI - A117.1
5. International Energy Conservation Code (IECC) - ASHRAE
6. National Fire Alarm Code (NFPA 72-02)
7. Sprinkler Systems (NFPA 13-02)
8. International Fire Code (IFC)

1.6.2 Reference Standards

1.6.2.1 American Gear Manufacturer's Association (AGMA) www.agma.org

a) AGMA 6009-A00, Standard for Gear Motor and Shaft Mounted Conveyor Drives.

b) AGMA 6035-A02, Practice for Enclosed Cylindrical Worm Gear Speed Reducers and Gear Motors.

1.6.2.2 American National Standards Institute (ANSI) www.ansi.org

a) ANSI A14.3, Fixed Ladders

b) ANSI A1264.1, Safety Requirements for Workplace Floor and Wall Openings, Stairs

c) ANSI B20.1, Safety Standards for Conveyors and Related Equipment

d) ANSI B29.10M, Precision Power Transmission Roller Chains and Attachments

e) ANSI B29.3, Double Pitch Power Transmission Chains and Sprockets

f) Z535.1, Standard Safety Color Code

1.6.2.3 American Society of Testing Materials (ASTM) www.astm.org

a) ASTM A36, Standard Specification for Carbon Structural Steel

b) ASTM A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

c) ASTM A307, Standard Specification for Carbon Steel Bolts and Studs

d) ASTM A325, Type 1 High Strength Structural Bolts

e) ASTM A569, Specifications for Steel, Carbon (0.15 Max Percent), Hot-Rolled Sheet and Strip

f) ASTM A1011, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low Alloy and High-Strength Low Alloy with Improved Formability

g) ASTM D378-00, Standard Test Methods for Rubber (Elastomeric) Belting, Flat Type

1.6.2.4 ASME B20.1–2012, Safety Standards for Conveyors and Related Equipment.

1.6.2.5 American Welding Society (AWS) www.aws.org

a) AWS A5.1, Specifications for Carbon Steel Electrodes for Shielded Metal Arc Welding

b) AWS C1.1M, Recommended Practices for Resistance Welding

c) AWS C1.4M, Specification for Resistance Welding of Carbon and Low-Alloy Steels

d) AWS C1.5, Specifications for the Qualifications of Resistance Welding Technician

e) AWS D1.1, Structural Welding Code Steel

1.6.2.6 Conveyor Equipment Manufacturers Association (CEMA) www.cemanet.org

a) CEMA 401, Roller Conveyors – Non-Powered

b) CEMA 402, Belt Conveyors

c) CEMA B105, Specifications for Welded Steel Conveyor Pulleys with Compression Type Hubs

1.6.2.7 National Electric Manufacturers Association (NEMA) www.nema.org

a) ICS 1, Industrial Controls and Systems

b) MG 1, Motors and Generators

1.6.2.8 National Fire Protection Association (NFPA) www.nfpa.org

a) NFPA 70, National Electrical Code (NEC)

b) NFPA 79, Electrical Standards for Industrial Machinery

c) NFPA 80, Standards for Fire Doors, Fire Windows

1.6.2.9 Occupational Safety and Health Administration (OSHA) www.osha.org

a) 29 CFR Part 1910, Occupational Safety and Health Standards

b) 29 CFR Part 1926, Safety and Health Regulations for Construction

1.6.2.10 Underwriters Laboratory (UL) www.ul.com

a) UL 62, Safety Standard for Flexible Cord and Fixture Wire

b) UL 845, Electrical Control Centers

c) UL 508, Industrial Controls Equipment

d) UL 508A, Industrial Control Panels

e) UL 508C, Power Conversion Equipment

f) UL 1998, Software in Programming Components

1.6.2.11 International Electromechanical Commission (IEC) 61508 http://www.61508.org Functional Safety of Electrical/ Electronic/Programmable Electronic Safety-related Systems

1.6.3 Applicable Codes

a) All electrical equipment and materials provided for the BHS shall conform to applicable standards of the National Electrical Manufactures Association (NEMA).

b) All components provided for the BHS shall be designed for continuous duty service.

c) Applicable requirements of OSHA, ANSI Conveyor Safety Code B20.1 and the National Electrical Code (latest edition) shall be met, as well as those of any other governmental or local authority having jurisdiction.

1.7 BHS SCOPE OF WORK

1.7.1 General

a) In all cases where a device or part of the equipment is herein referred to in the singular number, it is intended that such reference shall apply to as many such devices as are required to satisfactorily complete the installation.

b) The BHS contractor shall provide the design, engineering, programming, fabrication, transportation to and from the site, installation, temporary BHS conditions (e.g., Interim Conveyor Control Functionality, as required to maintain operations), removal, demolition, modifications, testing and turning over in

working order; the BHS portion of the Project scope described herein, in compliance with these written specifications and the accompanying drawings.

c) The BHS contractor shall provide complete, operable, maintainable and safe systems on a "turnkey basis", including electrical power to all BHS related equipment and/or components from the existing sources indicated on the accompanying drawings (i.e., from BHS MCPs to associated BHS field components), motors, motor starters, disconnects, controls, pushbuttons, conduit, wiring, (any required modifications to existing controls), fault diagnostics and associated reporting functionality, catwalks, ladders, baggage makeup device crossovers (including Control Stop/Start control stations) and all other necessary BHS components and/or devices, whether specifically shown and described, or implied in the plans and specifications or wherever is required to effectively accomplish the intended functions of the BHS project, as well as any necessary modifications to the existing power sources, PLCs.

d) The contractor shall provide for interfacing of the “future” conveyors shown on the design drawings. The contractor shall size Control Panel and Power Distribution capacity to accommodate the future conveyors and devices.

e) The BHS contractor shall design all parts and sub-assemblies in accordance with good industrial practice and assure safe, efficient and practical design in-keeping with requirements particular to this type of system. All BHS equipment shall be in imperial sizes and dimensions.

f) Submit to the Owner (or OAR) any request for information, clarification of the specification, and variance from the specifications as a Request for Information (RFI).

g) The price shall be full compensation for furnishing all labor, equipment, and materials necessary to provide the BHS in place and ready for “Beneficial Use”.

1.7.2 Pre-Bid Meeting

a) In the event that the Owner conducts a pre-bid meeting, which may include a site walkthrough of the area specified for the BHS work, the BHS contractor shall coordinate this pre-bid walk-through with the Owner (or OAR). It is highly recommended that the BHS contractor has the appropriate technical staff attend the on-site pre-bid meeting and participate in the site walkthrough to get thoroughly acquainted with the overall scope of work and installation restrictions directly associated with the existing areas of the facility.

b) Ensure that the appropriate BHS technical personnel attend the pre-bid site visit to review and survey the following project related requirements that are associated with the existing BHS including modifications to the existing baggage handling control systems required to support phasing.

c) Provide all hardware, software and construction supervision to ensure that there is a complete, total and fully functioning interface between the new and any

required existing subsystems, including modifications to any existing MCP or PLC systems so that the entire system operates on a fully integrated "turnkey" basis.

d) Any upgrades and/or modifications to the existing conveyor systems and construction of the new equipment and components of the systems shall be in accordance with all applicable codes and standards.

e) Perform a complete mechanical and electrical field survey of the existing BHS conveyor equipment that are affected by this project.

1.7.3 Temporary Conditions

a) The BHS contractor shall need to consider the availability of temporary access, temporary lighting and power, telephone services, internet services, storage facilities, water supply, waste disposal facilities, labor supply, weather conditions, parking of vehicles, loading and unloading of materials, and equipment laydown area conditions.

b) Provide all temporary power and lighting that may be required for and during the course of the temporary conditions, overall installation and testing of the BHS, in compliance with the specifications

1.7.4 Coordination

a) Take into account in the bid proposal the effect that any adjacent construction, operations and maintenance works may have on the BHS installation, testing and commissioning. Ascertain and allow in the bid proposal for all necessary precautions and for any difficulties that may arise in the execution of this BHS project. No claims arising out of the site constraints, difficulties of access, temporary services and facilities or labor shall be acknowledged by the Owner (or OAR).

b) The BHS contractor shall coordinate the BHS right-of-ways, related conduit and/or wireway runs, and maintenance catwalk design with other systems, (including the sprinkler system), to permit the installation of the sprinkler pipes below the new and existing catwalks or areas where they are projecting below adjacent conveyors.

c) The coordination between the design of other systems and the BHS equipment (conveyor segments, related conduits and/or wireways and catwalks) shall ensure the other systems do not interfere with the BHS operation or related maintenance access and baggage conveyor right-of-ways.

d) Sprinkler system lines and/or other MEP equipment shall not be supported by any BHS equipment or its supporting structure (i.e., BHS overhead and/or floor supports). The coordination shall ensure the required interface between the BHS equipment and the adjoining architectural building elements.

e) Identify all building interface requirements necessary to install the new and/or modified BHS as shown on the Contract Drawings. Verify as-built conditions and notify the Owner (or OAR) of any conflicts.

f) Coordinate with the Owner (or OAR) for the location of all MEP Right-of-Ways and access/egress between the BHS catwalks and the building to confirm the final number and locations of the BHS associated ladders and/or crossovers, as shown on the contract drawings.

g) Coordinate with all necessary BHS contractor disciplines on site and with the Owner (or OAR), the overall Project Implementation Schedule, the modified area layout, drive aisles, cart staging lanes and Airline's operational schedules, to avoid any conflicts.

1.7.5 Scope Overview

The BHS contractor shall provide all labor, materials, and equipment required for implementing the BHS portion of the Project Scope as defined by the associated drawings and specifications, all of which shall include, but not limited to the following:

a) Installation of required conveyor segments and associated equipment, as illustrated in the accompanying drawings.

b) Modifications to existing BHS and associated controls with all required interfaces between any existing and new conveyor segments and/or equipment and related components.

c) Demonstrations for the Owner's (or OAR's) acceptance inspections and testing (including required support and participation).

d) Temporary reinforcement of conveyor sections (with associated conduits, control stations and related BHS field devices), as needed to clear the right-of-way for upcoming installations.

e) Necessary wiring between BHS and equipment and/or components provided by others.

f) Necessary protection of conveyor equipment that is under construction.

g) Modifications, demolition and/or removal, including all required materials, and conveyor equipment with all related components.

1.7.6 Sequencing and Scheduling

a) Submit implementation schedules and associated phasing and sequencing plan documentation with the operating and maintenance documentation to the Owner (or OAR), including but not limited to required manuals, equipment parts lists and approved design drawings.

1.7.7 Field Verification

a) The Contract Drawings and Documentation are intended to generally outline the conveyor system configuration and function desired. Pertinent building

dimensions are noted along with specified conveyor dimensions and elevations. Conveyor length and right-of-ways are presented as approximations that must be determined by as-built of building construction drawings, verified against actual field measurements taken by the BHS contractor. The BHS contractor shall field measure actual conditions and dimensions, prior to preparing shop and installation drawings.

b) Determine the source of control power and coordinate it with the Owner (or OAR). The number, size and locations of the BHS Motor Control Panels/Centers (MCP/MCCs) are presented as approximations and shall also be field verified. Verify the final number of panels, with related cabinet sizes and locations based on the preparation of applicable electrical shop drawings and submit the System MCP sizes and related power requirements in accordance with the Schedule of Submissions.

1.7.8 Meetings and Scheduling

a) The BHS contractor shall provide appropriate personnel for attending the coordination meetings, as required by the Owner (or OAR). The BHS contractor shall coordinate the meetings with the General Contractor (GC) and follow the GC's schedule.

b) The BHS contractor shall anticipate a minimum of two (2) pre-installation meetings with the Owner (or OAR) to review all the exact interface and integration details for the Project. These meetings shall be scheduled within 21 days of the issuance of the Notice to Proceed.

1.7.9 Permits and Inspections

a) The BHS contractor shall obtain and pay for all permits, inspection fees, and certificates relative to all phases of BHS construction, and shall be responsible for all associated employee badges and fees as required by the Airport Authority for this project. The Owner (or OAR) shall not provide escort services to any of the restricted Airside Operations Areas (AOA) and/or Security Identification Display Areas (SIDA). Take on responsibility for all aspects of Airport security as it pertains to the BHS work and employees in all AOA/SIDA areas.

b) Submit all BHS drawings, structural attachment details, with associated computations, and point load drawings, "signed and sealed" by a registered Professional Engineer (PE) licensed in the jurisdiction where this Project is located. The PE shall review, verify and certify the design and installation of the BHS equipment structural systems and associated attachments to the building structure, which shall include all necessary temporary and final works.

c) Provide the Owner's Inspection Engineer unrestricted access to the Work for the required Special Inspections of all BHS related support attachments to the building structure and the review and approval of the BHS contractor's PE signed and sealed structural attachment documents and point loading diagrams as they relate to the actual onsite installation. These special inspections of BHS related

structural members shall be performed in compliance with the International Building Code. These services shall be performed at no additional cost to the Project.

1.7.10 Structural Considerations

a) The structural requirements of this Project are critical, given the structural design of the Airport. All components that require overhead support shall utilize structural steel, which shall be supported off the existing building joists. No attachment to the upper level deck (slab) shall be allowed. The Structural Attachment submission to the Owner (or OAR) shall be carefully scrutinized and evaluated.

b) Where required, provide all temporary and final conveyor equipment, components and support structures for the BHS, including columns, beams and header steel. Coordinate the proposed BHS support system with the Owner (or OAR), as well as the overall Project implementation schedules, and Airlines operational schedules.

c) All temporary and final conveyor equipment supports shall be designed and installed so as not to infringe on the Airport structure and/or facilities, and the Airline Operational Areas (AOA), drive aisles and cart staging areas.

1.7.11 Protection of Equipment

a) Coordinate and adequately protect the conveyor equipment from the Mechanical, Electrical and Plumbing (MEP) installations and/or modifications.

b) Ensure that adequate protection is provided around the associated conveyor segments (new, existing and/or modified) wherever the Facility and Utility modifications are occurring. Ensure that the construction around the conveyors and the protection provided around the conveyor segments allows for the uninterrupted and continued operation of the baggage handling systems.

1.7.12 Testing and Commissioning

a) The Contractor shall perform all required contractor and owner test demonstrations for specification conformance acceptance as defined in this specification and documented on the contractor prepared, approved, test plans.

b) The Contractor shall provide support and participation for the TSA's SAT, Pre-TRR, TRR and ISAT as defined in the IV&V group’s Site Specific Test Plans (SSTP) and the PGDS.

c) Provide all supervision, technical, labor, materials, and equipment required for commissioning defined by these specifications and the PGDS.

d) Prior to the start of the Owners Acceptance Testing perform all "debugging" and internal testing and carry out a "dry test run" of all Acceptance Tests prior to conducting such tests with the Owner (or OAR) to ensure that tests conducted with the Owner (or OAR) are successful. These tests must be completed, and

necessary documentation submitted for review prior to moving to the next phase of testing required. Time for review of the submitted documents shall be allotted within the contractor's schedule.

e) Make available to the Owner (or OAR) on a daily basis any and all records of internal BHS testing and debugging (with corrective action) performed prior to Acceptance Testing.

f) Upon completion of the BHS Project, (all related programming and internal testing and/or debugging is complete), demonstrate the system's operating capability to the Owner (or OAR) for acceptance and to confirm compliance with the specified requirements.

1.7.13 Site Project Management and Technical Support

a) A BHS contractor site supervisor or project manager (direct employee) shall be on-site during every stage of construction and installation. At no time will subcontractors be doing work on-site without such supervision.

b) The appropriate technical (mechanical, electrical, PLC or software) staff shall be on-site during installation, testing and live bag commissioning. Technical staff shall be on-site for the Conditional Acceptance Operational Period for the BHS after going live. Subsystems shall require technical staff to be on-site for the 40 hour run-in period, at minimum, unless otherwise authorized by the owner.

1.7.14 Auxiliary Labor

a) Provide all associated labor and test material as specified elsewhere in this document, including service technicians and test material handlers for the BHS Acceptance Testing. These test demonstrations shall be carried out, as part of the base contract, per the BHS Test Plans that shall be prepared by the BHS contractor, in compliance with the requirements of this specification.

1.8 PROJECT CONDITIONS

1.8.1 General

a) The Owner (or OAR) does not guarantee the accuracy or the completeness of the information relating to the new and/or existing Baggage Handling Systems, utility services, facilities, or structures that may be shown on the drawings or encountered in the work. Any inaccuracy or omission in such information shall not relieve the BHS contractor's responsibility to protect such existing features from damage or unscheduled interruption of operations and services.

b) It is noted that airport is currently a fully functional facility and shall remain in operations for the entire duration of the Project. The BHS contractor is required to closely follow the outlined phasing plans and coordinate all activities with the Owner (or OAR), so as not to cause any undue disruptions to the Airport and/or Airline operations.

c) Coordinate all building modifications performed by any associated trade to accommodate the phased installation of the BHS.

1.8.2 Required Notice

a) Prior to commencing the work in the general vicinity of an existing baggage conveyor system, utility service or facility (i.e., a subsystem that has been previously turned over for operational use by the BHS contractor or an existing subsystem that is in operational use), the BHS contractor shall notify the Owner (or OAR) in advance, (per the supplementary conditions for system outage and/or interruption) and obtain approval before proceeding with the work. Failure to give the required notice shall be cause for the Owner (or OAR) to suspend the BHS contractor's operations in the general vicinity of the system, utility service or facility.

1.8.3 Damage or Interruption

a) Should damage or unscheduled interruption of Airline operations, utility service or Airline facility occur by accident or otherwise, the BHS contractor shall notify the Owner (or OAR) and take all reasonable measures to prevent further damage or interruption of service. In such events, cooperate with the utility service, and the Owner (or OAR) until such damage has been repaired and service restored to the complete satisfaction of the Owner (or OAR) and the utility service, at no cost to the Owner.

1.8.4 Installation Conditions

a) The BHS shall be installed within the existing Airport Facility, working simultaneously with other trades. The existing conveyor systems and associated equipment is currently in use on a consistent basis by User Airlines.

1.8.5 Phased Implementation

a) Comply with the Phased Implementation general requirements and outlined phasing summary specified herein, in compliance with the overall Project schedule, and applicable requirements.

1.8.6 Ramp Area Proximity

a) The portions of the construction and/or installation associated with this Project shall take place immediately adjacent to active Airline operations areas.

1.8.7 Lay-Down Area Restrictions

a) Lay-Down and shake out areas may be limited to the confines of the immediate building. All Lay-Down areas shall be designated and approved by the Owner (or OAR).

1.8.8 Restoration of Service Costs

a) The BHS contractor shall incur all restoration of service costs due to his/her negligent or accidental damage of any Airport utility service or facility. The Owner

(or OAR) reserves the right to deduct such costs from any monies due, (or which may become due), to the BHS contractor.

1.8.9 Protection of Work

a) The BHS contractor shall make explorations and probes as necessary to ascertain any required protective measures, before proceeding with installation, demolition and/or removal of any associated equipment. Particular attention shall be given for equipment supports and bracing requirements, (to prevent any damage to new and/or existing BHS equipment).

b) Provide, erect and maintain catch platforms, dust partitions, lights, barriers, warning signs and other items (as required) for proper protection of operating personnel, the public, occupants of building, workmen engaged in installation, removal and demolition operations, and adjacent construction. Comply with the requirements and restrictions of the Contract Drawings.

c) Do not store or place materials in passageways, stairs or other means of egress. Do not close or obstruct walkways, passageways, stairways, streets, walks, terminals, runways, rights-of-way, or other occupied or used facilities without written permission from the Owner (or OAR). Conduct all operations with minimum traffic interference.

d) Provide and maintain temporary protection of the existing BHS designated to remain where demolition, removal and/or new work is being done, connections being made, materials handled or equipment moved. Protect unaltered portions of the existing system affected by the operations of the work, so that the normal activities conducted in such areas may continue with no interference.

e) Utilize suitable coverings to protect existing work. Be responsible for any damage to the existing BHS and facilities or other contents by reason of the insufficiency of protection provided. Promptly repair any damage caused to adjacent facilities and restore as new.

f) The BHS contractor shall repair any damage to work in place and notify the owner (or OAR). This shall include repair of both new and existing fireproofing materials, including fire-rated walls that were removed to allow the installation of BHS structural attachment supports, header steel and installation of conduits, junction boxes, etc.

1.9 BHS GENERAL PROVISIONS

1.9.1 General

a) The extent of the “phased work” shown on the Contract Drawings, comprised in part by design criteria drawings and as specified herein, is defined to include but not limited to: Labor, Materials, Equipment, Supervision, Design and Fabrication, Installation and Testing.

b) The BHS contractor shall perform modifications as necessary to meet requirements of the Contract Documents, and to coordinate the work subject to acceptance by the Owner (or OAR). Maintain design concept without altering profiles and alignments, unless documented written acceptance and approval is received from the Owner (or OAR).

c) Variations in details and materials shall not adversely affect appearance, durability, strength and performance of the system. Provide complete drawings and data of any proposed modifications.

1.9.2 BHS System Elements

a) The BHS contractor shall furnish and install all necessary equipment to provide a complete, operable and maintainable system including but not limited to:

1. Conveyor bed sections
2. Drives
3. Take-ups
4. Side guards
5. Shrouding
6. Floor supports
7. Ceiling hangers and headers
8. Stainless steel panels and conveyor trim
9. Fire/security doors
10. Draft curtains
11. Catwalks, Platforms and Access ladders
12. Guard rails
13. Motor Control Panels
14. Conduit and wiring
15. All controls including interface with all baggage-related equipment and screening equipment.
16. Any other materials or equipment required to provide a complete, operable and maintainable system in complete compliance with this specification.

1.9.3 Existing Conveyors

1.9.3.1 General

a) BHS contractor shall perform a complete evaluation of all the existing BHS conveyors and the associated power and controls scheduled for demolition and notify the Owner (or OAR) of any potential complications with the modifications and/or removal of any existing systems and/or associated equipment.

1.9.3.2 Temporary Systems

a) BHS contractor shall provide all required temporary conveyors, power and equipment necessary to minimize operational impacts to the Owner (or OAR) and/or Airlines.

b) The extent of operational impacts shall be coordinated and approved by the Owner (or OAR).

c) Current BHS drawings shall be maintained and located on-site, throughout the system upgrades and/or modifications.

1.9.3.3 Demolition of Existing Systems

a) BHS contractor shall demolish (demo) all existing conveyors required for this project, including all associated equipment. Demo temporary conveyors and all associated equipment. Demo items typically include, but are not limited to, those listed below:

1. Conveyor bed sections
2. Drives
3. Take-ups
4. Side guards and shrouding
5. Floor supports
6. Ceiling hangers and headers
7. Stainless steel panels and conveyor trim
8. Fire/security doors and draft curtains
9. Catwalks, platforms and access ladders
10. Guard rails
11. Control panels
12. Conduit and wiring
13. All corresponding controls and devices (back to source / MCP)

b) The owner shall have the right to salvage and retain any demoed equipment. Coordinate with the Owner (or OAR) to review and determine what equipment shall be salvaged and what shall be disposed. The contractor shall assume a 48 hour window to allow the airport to denote and retain the salvaged components prior to disposal.

c) The Owner (or OAR) shall have first right of refusal on all existing conveyor equipment to be removed. Any conveyor equipment remaining shall become property of the BHS contractor and shall be removed from the site in a timely manner.

d) At no time shall conveyor equipment remain on site after removal in excess of 48 hours, without written approval from the Owner (or OAR).

1.9.4 BHS Work Provided

a) The BHS work provided under this specification section shall include but is not limited to:

1. Permits
2. Supervision
3. All associated labor
4. Tools and equipment

5. Materials
6. Design and programming
7. System integration
8. Testing and Commissioning
9. Inspection and/or re-inspection fees
10. Transportation
11. Security badging
12. Insurance
13. Temporary protection
14. Temporary lighting
15. Temporary conveyors and controls
16. Phased construction
17. Testing and Owner (or OAR) acceptance.

1.9.5 Incidental Items Provided

a) Provide all incidental items that are required for BHS installation and operation of all the systems, as specified in the Contract documents, and for temporary construction to maintain existing Airport operations, (including portering of baggage, as required). The BHS contractor shall provide and install the following:

1. Warning devices
2. Safety signage and Lights
3. Platforms and Partitions
4. Barriers, Bollards and Guard rails
5. Supports and anchors
6. Stanchions and Mounting brackets
7. Framing and trim
8. Ladders, Stairs and Crossovers
9. All other items required for protection of personnel and equipment in the area of the work.

1.9.6 Provide Turnkey System

a) The BHS contractor shall provide “Turnkey Systems” that are complete, operable, maintainable and safe. This shall include:

1. Electrical power to the BHS (from power distribution points)
2. Motors and Motor Safety Disconnects
3. Cabinets and junction boxes
4. Conduits and wiring
5. Control stations and control devices
6. Limit switches and/or photoeyes
7. Shaft Mounted Encoders
8. Fire/Security Doors
9. All other required components, whether specifically shown or implied in the plans and specifications.

10. Programming and integration into current control systems.
11. Testing and Commissioning.

1.9.7 RFI Request for Information

a) RFI shall be submitted when there is a discrepancy or concern discovered by the contractor. These shall be submitted for review with pertinent information related to the concern and may include specification reference, drawing reference, photographs, meeting minutes and a required answer date. Any potential impacts to schedule or cost shall also be noted for consideration.

b) The BHS contractor shall be responsible for the Airport Authority's administrative costs for answering Requests for Information (RFI)'s that could reasonably be found by reviewing the Contract Documents or are solely for the convenience of the BHS contractor. These costs may be deducted from BHS progress payments.

1.9.8 RFS Request for Substitution

a) The contractor shall adhere to the Request for Substation processes and documentation requirements as defined in the Division 1 specifications.

b) The use of any alternate equipment, or substitutions of components and/or materials, (other than those alternates specifically listed or detailed out and identified within the specification) shall not be acceptable without the written approval of the Owner (or OAR).

c) If the BHS contractor proposes to use any articles, devices or materials that he believes are equal in quality, finish and durability and are equally suitable for the purpose intended as the particular articles, devices, or materials specified, the BHS contractor shall submit a "Request for Substitution" (RFS) for each item to the Owner (or OAR) in writing for approval. The RFS shall include all relevant specifications, cut sheets, test results, references, and identify where the item is currently in use.

d) The articles, devices and materials specified shall not be changed except with the written consent of the Owner (or OAR). The BHS contractor shall not contract, purchase, or cause to be delivered any substitute articles, devices, or materials prior to obtaining such written approval from the Owner (or OAR).

e) Equivalent products of any manufacturer that are not listed in the specifications as "Acceptable Manufacturers" are subject to the submittal requirements (per the substitution procedures).

f) The Owner (or OAR) may request additional or more detailed information or documentation from the BHS contractor for evaluation, within fourteen (14) calendar days of receipt of the submittal.

g) Substitutions that are requested during the bidding phase and accepted by "Modification of the Bid" (and clarified by BHS contractor's written addendum) shall not be subject to the requirements specified in this section.

h) Any requests for substitutions shall be submitted prior to the date of bid closing and formatted (as outlined) in the substitution procedures. The BHS contractor shall be responsible for all additional costs incurred as a result of any re-design to accommodate "approved equal" items.

i) Any changes in equipment, components, materials, products or methods of construction (after the contract is awarded) shall be construed as "substitutions", and must be pre-approved by the Owner (or OAR)

j) Substitutions shall not be considered if they are only identified on the drawings or product data sheets, (without a separate formal request). Approval of drawings shall not constitute approval of any substitutions proposed. Product data or samples for construction that do not comply with the Contract Documents shall not constitute acceptable or valid requests for substitution.

1.9.9 Non-Compliance of Substitutions and Design Deviations

a) If at any time the approved substitution or deviation does not perform to the standards and publications submitted for the item in question, the BHS contractor shall bear the responsibility of the replacement, and/or any associated costs with the implementation of the replacement of the item as originally designed, per this specification.

b) The BHS contractor shall also be responsible for any liquidated damages that may occur due to scheduling delays associated with the substitution or deviation.

1.9.10 Design Deviations

a) If the BHS contractor desires to deviate from the design, the BHS contractor shall submit a "Request for Deviation" for each item to the Owner (or OAR) in writing for approval

b) The Request for Deviation shall include all information relevant to the reason for the deviation to the design. The proposed changes to the design as specified shall not be changed except with the written consent of the Owner (or OAR).

c) The BHS contactor shall not contract, purchase, or cause to be delivered any substitute articles, devices, or materials relating to the deviation to the design prior to obtaining such written approval from the Owner (or OAR).

1.9.11 Compensation for Impacts

a) The BHS contractor shall not be entitled to any additional compensation or time, (unless the cause and impacts are attributable to parties other than the BHS contractor).

1.9.12 Discrepancy Notifications

a) The BHS contractor shall field verify (prior to design and fabrication) all measurements, dimensions, elevations and quantities. Any discrepancy that is found shall be submitted to the Owner (or OAR) for consideration before proceeding with the work, no later than five (5) calendar days after the discrepancy discovery.

1.9.13 Replacement of Fireproofing

a) The BHS contractor shall repair or replace any fireproofing materials and finishes that were removed or damaged during the demolition, modification, and/or new installation of the BHS equipment or ancillary items.

1.9.14 Maximum Baggage Dimensions

a) The BHS equipment shall be capable of conveying baggage of various shapes and sizes with dimensions not exceeding:

1. 36 inches in height
2. 30 inches in width
3. 54 inches in length

1.9.15 System Reliability

Reliability requirements of the total BHS shall be measured in terms of "System Availability" (A_s).

1.9.15.1 Failure

a) A failure is defined as any malfunction of a BHS component, assembly, or subassembly which stops normal operations. A failure shall be charged against only the one subsystem, which causes that failure.

b) The following shall not be classified as failures:

1. Malfunctions caused by a failure on the Owner’s part (after system acceptance) to properly maintain and operate the BHS in accordance with approved procedures.
2. Malfunctions due to causes outside the BHS such as general power outage, etc.
3. Malfunctions due to baggage jams not caused by failure of a BHS component, assembly or subassembly unless it is a defective part, a poor installation, or a failure of a component or subassembly to perform its intended function.
4. Incipient failures, which are detected and repaired without affecting normal operation of the BHS.

1.9.15.2 Sub-System Availability (As)

a) Sub-System Availability (As) shall be defined by the following equation:

As = (ST - RT) / ST

Where:

ST = Scheduled Operating Time: The scheduled time that the BHS is available for baggage processing (normally 18 hours per day).

RT = Repair Time: The interval of time between initiation of repairs due to a failure and return of the BHS to operation.

b) A subsystem shall be defined by its conveyor subsystem identification or E-Stop zone, whichever is more stringent.

c) Each subsystem of the BHS shall have an availability of not less than 0.99 (99%), to be calculated on a monthly basis.

d) The maximum allowable downtime in a single operating day shall be no more than 15 minutes on one subsystem and an accumulative downtime for all subsystems not exceeding 30 minutes, on a monthly basis.

e) Jams occurring due to improper loading do not count against the reliability.

f) All computer and control systems (including but not limited to BHS host computers, Sortation computers, and Operator Workstations) shall have an availability of not less than 0.999 (99.9%) to be calculated on a monthly basis. However, the maximum allowable downtime in a single operating day shall be no more than 2 minutes for a single event. The maximum downtime where both slave/master pair within computers, PLCs, and workstations fails simultaneously shall be 10 minutes in a year. System availability shall be demonstrated and monitored during system acceptance testing and shall be proven (through operational reports) that it is maintained during the operational period prior to system final acceptance.

1.9.16 Noise Level

a) The BHS and associated equipment shall not increase the ambient noise level in public areas by more than 15 dB (A).

b) The bag room and all other associated non-public areas shall not exceed 75 dB (A).

c) The ambient noise levels for the BHS equipment shall not exceed OSHA standards.

d) Noise levels shall be limited throughout the system to the following criteria:

	TSA/Public Area	Equipment Area
Maximum	65 dbA	75 dbA

e) Noise measurements shall be made under free field conditions according to DIN 45635/OSI 3744, average three feet from drive sections.

f) The dbA values do not include the noise due to baggage.

g) Noise levels shall be measured with an A-weighted sound level meter (or 1/3 band octave analyzer) and converted to sound power levels.

h) Areas of measurement shall be at Owner's (or OAR's) discretion.

1.9.17 BHS Radio Frequency Interference:

a) If the BHS causes the radio interference to be above the Airport acceptable level, suitable filtering and suppression shall be provided and installed by the BHS contractor.

b) The equipment provided shall not cause interference with communications within the Airport, or between the Airport and aircraft or ground vehicles.

c) All electrical and electronic equipment, including interconnecting wires and cables, shall be designed to operate without malfunction in the presence of normal "electromagnetic emissions" generated by other equipment installed and/or used at the Airport.

d) The normal Airport environment includes the aircraft communications bands and high power "radar systems". The environment shall include various electrical motors and controls, power tools, welders, automotive vehicles, etc.

1.10 BHS QUALITY ASSURANCE

1.10.1 BHS Contractor Qualifications

a) Authenticate a minimum of five (5) years of demonstrable experience as a "Turnkey" BHS contractor for automated baggage handling systems with at least four (4) projects where the completion of a minimum project value of $3,000,000 (per project) that utilized ATR(s) for the automatic processing of baggage, direct interfacing with the Airline industry reservation systems for IATA bag tag information processing, high-speed baggage diverters capable of operating at a minimum throughput rate of 60 bags per minute, computerized sortation control systems controlling PLC systems, baggage tracking and computerized report generation for operational as well as maintenance status and graphic fault annunciation for the automated baggage system.

1.10.2 Schedule Management

a) The General contractor or BHS contractor shall submit for Owner (or OAR) approval and maintain a critical path schedule of all major activities, dependencies between task activities, milestones, and phases required to demonstrate the successful completion.

1. The BHS schedule shall be developed and maintained using Microsoft Project (current version).
2. Schedule days shall be defined as "Standard Work Day" and "Standard Work Week", using calendar days.

3. The schedule shall include review times by the Owner (or OAR) for submittals, and allow time for re-submission (if required), prior to fabrication.
4. Baseline schedules shall be updated at least monthly to coincide with the date of the reporting period, or as otherwise required by personnel tasking.
5. A separate submittal log and listing of all submittals shall be provided with project schedules and updated each week.
6. Special consideration shall be made for TSA deliverables and milestones. These are important to the planning and shall be coordinated with the TSA to ensure that the components are installed when needed so as to not negatively impact the project schedule. This coordination effort is the responsibility of the BHS contractor. Similarly, all testing and certifications to be performed by the contractor in conjunction with the TSA or its independent contractors shall be shown on the schedule with appropriate durations as specified in PGDS or as coordinated with the TSA Site Lead.

1.10.3 Quality Assurance Resolutions

a) The Airport Inspector, or OAR, shall perform the Quality Assurance (QA) inspections of the baggage systems during the conveyor installation.

b) Any discrepancies that are found shall be logged in a QA “Open Issues” Log. All Items logged in the QA “Open Issues” Log shall be brought to the attention of the BHS contractor for discussion.

c) A reasonable resolution date for each of the items on the log shall be agreed upon, with the BHS contractor. If the discrepancy is not corrected within the accepted time frame, the unresolved item shall then be assigned a Quality Assurance Report (QAR).

d) When the QAR is generated, the BHS contractor has 24 hours to correct the discrepancy. If the discrepancy is not addressed (and corrected) within 24 hours of the QAR, a letter of non-compliance shall be issued to the BHS contractor. The letter of non-compliance shall state:

1. The issues
2. Date and time that the issues were discovered
3. The BHS specification reference to the issues
4. The monetary value to correct the issues for which the BHS contractor shall be responsible.

e) Any discrepancies that are found during QA inspections that are determined by the Airport QA inspector, or the Owner’s designated representative (or any associated safety inspector) to be a safety or operations issue shall be issued as a QAR to the BHS contractor.

1.10.4 Standards

a) The BHS integration contractor shall document and provide a minimum of three (3) years of successful experience designing, programming, installing,

integrating, and commissioning at least four (4) control systems of equivalent size and complexity, including (ATRs, BMAs, HSDs, VSUs, MISs, MDSs, EDSs, ETDs, and Sortation Computers).

b) The BHS contractor shall develop, utilize, and maintain a documented Quality Assurance system. The BHS contractor shall forward the appropriate contract requirements to their sub-contractors and suppliers to ensure compliance with the contract.

c) The BHS contractor shall provide a designated Representative as a “point of contact” for all communication on quality-related issues. The quality representative shall be responsible for accomplishment of all associated quality assurance tasks.

d) The BHS equipment that is covered by these specifications shall be designed, assembled and tested in accordance with the latest applicable standards of the following:

1. American National Standards Institute (ANSI) www.ansi.org
2. National Electrical Manufacturers Association (NEMA) www.nema.org
3. Institute of Electrical and Electronic Engineers (IEEE) www.ieee.org
4. Conveyor Equipment Manufacturer’s Association (CEMA) www.cemanet.org
5. Underwriters Laboratories (UL) www.ul.com
6. National Fire Protection Association (NFPA) www.nfpa.org

e) All the BHS electrical work shall be done in accordance with the latest applicable municipal electrical codes and the latest version of the N.E.C., (whichever is more stringent).

f) All BHS components shall be new and “UL” labeled (where such approval is granted to the equipment to be furnished). www.ul.com

g) All associated equipment shall adhere to the most recently published applicable federal specifications and applicable OSHA specifications. www.osha.org

h) BHS fasteners shall be stainless steel (public areas), cadmium plated, or zinc plated, and locked with lock washers or lock nuts.

i) BHS stainless steel trim shall be AISC type 304, #4 Brush Finish www.aisc.org

j) BHS structural steel shall be ASTM A-36 www.astm.org

1.10.5 Workmanship

a) The BHS contractor shall use the latest and best trade methods throughout the BHS. Professional workmanship shall be executed in accordance with the best commercial practices consistent with “heavy duty” Airport applications. Equipment shall be designed to meet the requirements of Airline baggage handling systems.

1. The BHS contractor shall correct or replace any work that has substandard workmanship (at no additional cost to the Owner).
2. All equipment, materials and components furnished shall be new and free from defects. Used equipment, (whether reconditioned or refurbished), shall not be acceptable.
3. All associated equipment shall be the current version of the manufacturer at time of "Notice to Proceed" (NTP). When any product has available factory upgrades or modifications, such upgrades and modifications shall be fully implemented at the factory (and receive full factory testing and certification). Field installed equipment upgrades and modifications shall not be conducted without written approval of the Owner (or OAR).
4. All projections, welds, and transfer points between conveyors shall be smooth to eliminate damage to various types of bundles, handbags, suitcases, and trunks. Bottom glides on cases, strings, tags, straps, bag handles, destination tags, etc. shall be protected against damage from conveyor side guards, transfer points and all other surfaces against which baggage may come into contact during baggage handling.

1.10.6 Welding

a) All BHS welding shall comply with the current applicable AWS and ASTM standards. www.aws.org www.astm.org

1. Areas to be welded shall be free from rust, grease or other foreign matter for a distance of at least 1/2 inch back from the edge of the weld. Make all fillet welds a minimum of 1/8 inch, unless otherwise noted on the drawings.
2. Repair all pinholes, cracks and other defects by chipping and grinding out the defects and re-welding.
3. After the welds are made, clean them of slag and spatter to show uniform sections, smoothness of metal, feathered edges (without overlap or undercut).
4. Visual inspection at the edges and ends of the welds shall indicate good fusion with the base metal.

1.10.7 Alternative Materials/Standardization

a) No alternative materials may be utilized in the BHS without prior approval of the Owner (or OAR).

b) When multiple manufacturers are listed for a specific component within this specification, the BHS contractor shall use one specified manufacturer for a specific component.

c) BHS contract shall submit an RFS for any alternative material.

1.11 BID PROPOSAL

1.11.1 Proposal General

a) The BHS contractor is expected to have thoroughly reviewed the BHS design and requirements (presented in the specifications, documents and drawings) and accepted the design and requirements as being suitable and viable to safely accomplish the functions and processes described in the bid submission.

b) The BHS contractor shall conduct a job-site review, (prior to submission of the bid proposal), to become familiar with all job-site conditions that may impact the proposal.

c) The BHS contractor shall identify any design aspect or specification requirement that is believed to be unsuitable or inadequate, (along with an associated cost to remedy, provided as an alternative).

d) The BHS contractor shall provide (in the bid submittal) the pricing for the “base systems” that are presented in the corresponding drawings and specifications.

e) In the BHS proposal submission (attached as a separate document to the GC’s bid), include the following items, listed below.

1. All line-item costs are for the Owner’s reference and comparison. The cost of these work items shall be included in the base bid, and not be misconstrued as unit costs.
2. Any exceptions to these specifications, drawings or contract terms in a separate section (titled “Exceptions”).
3. Identification of any requirements that are more stringent than what is shown (in the drawings and/or specifications).
4. Notification of any potential safety hazard with the specified design of the system or its components.
5. The BHS contractor’s requirements for any “Lay-Down areas” (include line-item cost for offsite storage).
6. Project schedule outline by phase, for the implementation of the BHS.
7. Notification if an adjustment is necessary for the BHS contractor's submittal deadlines.
8. Allocation to purchase items listed in the estimated spare parts list (detailed in “BHS Estimated Spare Parts List” and other related documents for the spare parts criteria).
9. List of BHS contractor’s related Projects including client, current contact phone number, current email address, website, physical location, and type of work, date completed and overall cost.
10. Provide a list of all personnel staff with resumes and qualifications that shall be working on this Project. Include on-site and off-site participating staff and their corresponding job function. The Owner (or OAR) reserves the right to approve or reject any BHS contractor’s key personnel from the list.
11. The type and the duration of the proposed BHS O&M training programs, if different than the minimum requirements (listed in the specifications).
12. Indicate the types and quantities of required testing material as well as manpower.

13. Provide a line item cost for any additional onsite support after final acceptance.
14. Provide acknowledgement that the bid submitted includes all of the necessary work to meet the requirements for this Project.

1.12 BHS SUBMITTALS

1.12.1 Submittal General

a) All BHS submittals shall adhere to the processes and requirements of the Division 0 and Division 1 specifications for this project.

b) All submittals shall be prepared in the “English” language.

c) BHS submittals shall be in accordance with the conditions of the Contract and Specifications. Submit the documentation at the time specified during the course of the work, and in accordance with the Submittal Deadlines.

d) All document and drawing submittals shall be provided with a bound cover page, an index, and a table of contents identifying the submittal contents. All drawings submitted shall have the appropriate title, date of the original drawing, revision number, and current date.

e) The Owner (or OAR) shall review, comment and transmit all comments in writing on each required submittal within fourteen (14) calendar days upon receipt of the complete submittal. Partial submittals are not acceptable.

f) The BHS contractor shall submit the proposed catalog data (cut sheets) of all equipment to be furnished, within three (3) weeks of the award of the BHS contract.

g) All the BHS drawings that are submitted shall become the property of the Owner (or OAR).

h) Submit each BHS shop and installation drawing for review, as follows:

1. Two (2) ANSI-"E" size copies and two (2) electronic copies in “.pdf” format (latest version).
2. Two (2) copies in AutoCAD latest edition “.dwg” format on CDs, DVDs or other approved media.

i) The Owner (or OAR) shall review (and Red-Line) the BHS drawings and/or documentation and return them for Revision and Re-submittal within 21 calendar days.

j) The BHS contractor shall “Revise and Re-submit” the BHS drawings and/or documentation for final review to the Owner (or OAR) within 14 calendar days.

1. Any corrections or changes on the returned BHS drawings and/or documentation shall not be considered as an extra work order. The fabrication of any equipment is at the BHS contractor’s own risk, until the receipt of the

Owner's (or OAR's) approval. Any "Revised and Resubmittal" made by the contractor shall contain a matrix listing all corrections required and the mitigation taken to alleviate the comment. This matrix shall be submitted with the resubmission of each document.

2. The Red-Line comments (and/or notes) on the BHS drawings and/or documentation from the Owner (or OAR) shall not indicate that the drawing has been checked in every detail. The Owner's (or OAR's) review and/or comments shall not release the BHS contractor of his responsibility of ensuring that the BHS equipment complies with all the specifications, drawings and functionality.

k) The BHS contractor shall be fully responsible for the functionality and dependability of the BHS and the associated systems and components as indicated in the drawings, specifications and other documentation submitted (including all subsequent amendments).

l) The BHS contractor shall not submit any drawings that are not in compliance with the Contract Documents unless a Change Order Request (COR) addressing the discrepancy or change is sent with the submittal. In this situation the Owner (or OAR) should respond within the time frame stipulated within the Contract.

m) Submit an updated BHS drawing list (that contains all of the anticipated installation and shop drawings) with each drawing submittal.

n) BHS AutoCAD drawing borders shall include the following information:

1. Three letter Airport code
2. Name of the baggage handling system
3. Drawing title
4. Drawing scale
5. Drawing sheet number
6. Drawing revision level
7. Date
8. The project number shown on the contract drawings

1.12.2 Submittal Deadlines

a) Provide all submittals for the BHS system in accordance with the requirements to the Owner (or OAR).

1. Submittal Log -10 days after NTP and updated with each submittal.
2. BHS Project Management Team - 10 days after NTP
3. Quality Control Manual - 21 days after NTP
4. Detailed Master Schedule - 21 days after NTP
5. Product Data (Electrical & Mechanical) - 21 days after NTP
6. Detailed Mechanical Shop Drawings - 30 days after NTP
7. Detailed Electrical Shop Drawings - 45 days after NTP
8. Functional Specification - 45 days after NTP
9. Baggage Hygiene Policy - 30 days prior to BHS testing

10. Factory Acceptance Test Documentation – 30 days prior to FAT test
11. BHS Test Program (Static, Dynamic & Functional) - 21 days prior to owner testing
12. Site Specific Test Plan (SSTP) and Documentation - 120 days before ISAT testing
13. BHS Warranty - 60 days prior to beneficial use
14. Estimated Spare Parts List (Electrical & Mechanical) - 60 days prior to beneficial use
15. O&M Manual Draft (for Owner Review) - 60 days prior to beneficial use
16. BHS Training Program - 45 days prior to beneficial use
17. O&M Manual Final - 14 days after DBU
18. Closeout Documentation –14 days after DBU.
19. PLC and Software Disaster Recovery Procedures –14 days after DBU.

b) Other Deadlines and Timetables

1. Work Activities Bulletin - 14 days prior to each activity
2. BHS Test Reports - 7 days after completion of testing
3. BHS Reliability Calculations - 14 days after start of beneficial use (live operations)
4. Certificate of Installation Compliance - 14 days after completion of BHS installation
5. Weekly Report - Last day of each week (schedule, open RFIs/RFSs, Slippage, 2-week, mitigation, roadblock, submittal status)
6. Revise & Re-submit Drawing Period - 14 days after red-lines returned from the Owner
7. Owner Review & Re-review Period - 14 days after BHS resubmittal

1.12.3 Project Management Team and Staffing Plan

a) Submit to Airport for review and approval, the following listing of key personnel with resumes and qualifications that will be working on the project:

1. Senior Project Executive
2. Site Manager(s)
3. Professional Engineer(s)
4. Safety Manager
5. Configuration Control/Schedule Manager(s)
6. Quality Control/Assurance Manager(s) or On-Site Trades Coordinator(s)
7. Project Manager(s) - Electrical and Control Systems Engineering
8. Project Manager(s) - Mechanical Engineering
9. Project Manager(s) - Computer Systems Engineering
10. Instructors/training personnel (in addition, provide instructors professional qualifications)
11. Subcontractors and points of contact for each Superintendent, Lead Engineer or Project Manager.

b) Include site management and key team member percent participation and the phases that team members will be on-site.

c) Submit a staffing plan broken out by trade (e.g., number of millwrights, mechanical/electrical technicians and control/computer programmers) for each Phase of this project for review and approval by the owner (or OAR).

d) The site management team and other key team member shall have records of past performance to assure the Owner (or OAR) that they have the experience, competence and integrity to successfully complete a project of similar or greater magnitude.

e) The BHS Project Executive and Site Manager(s) shall not be changed without the owner's written approval.

1.12.4 Submittal Log

a) Provide a log listing all required Project submittals to include, at a minimum, the following information:

1. Type of submittal
2. Title of submittal
3. Specification reference
4. Submittal revision number. (This shall also be clearly identified within the submitted document as well)
5. The date submitted
6. Submittal status
7. Company or individual the submittal is sent to
8. Date in which the submittal was returned after review has been completed

1.12.5 Master Schedule Contents

a) The BHS contractor shall submit a detailed Master Schedule for review and approval by the Owner (or OAR) prior to any work. Show the schedule in an easy-to-read graphic form containing at a minimum the following:

1. The beginning and ending of mechanical, electrical and controls engineering by subsystem (or phase)
2. The drawing submittals and approvals by subsystem (or phase)
3. The equipment fabrication by subsystem including lead times (or phase)
4. The date equipment ships to site by subsystem (or phase)
5. The mechanical, electrical, and controls installation by subsystem (or phase), along with tie-ins
6. The system interface and integration dates
7. Planned submittal
8. The subsystem or phase of commissioning
9. TSA or other third party required milestones for testing and commissioning related activities.
10. The system acceptance testing by subsystem (or phase)

11. The operational status dates by subsystem (or phase)
12. The punch list correction date
13. The final acceptance testing

b) System Installation Phasing Plan

1. BHS contractor shall submit a detailed installation phasing plan, which identifies operational impacts for approval by the Owner (or OAR). Describe the preliminary phasing plan and any operational changes that shall be considered.
2. The phasing plan shall provide the least amount of operational impact and utilize overnight tie-ins during non-operational hours whenever and wherever possible.
3. Provide a phasing plan for each BHS subsystem with a description of the work, and the required staffing related to installation, testing and portering which may be required to ensure that the system remains operational during the project phasing.

1.12.6 Product Data

a) Provide the bill of materials for BHS electrical and mechanical devices with part numbers and catalog cuts.

b) Provide BHS product data (cut sheets) for all components for this Project. The equipment provided for this work shall be indicated appropriately on the cut sheets, (with arrows). The contractor shall ensure that like components are used wherever possible, match existing, so long as they meet the intents of the specification.

c) After approval of the shop drawings, no variations from the submittal data shall be permitted except by written consent of the Owner (or OAR).

d) The BHS documentation shall include the table of contents, electronic bookmark index tabs and revision notes, in searchable ".PDF" format.

e) BHS products shall include but not be limited to:

1. Motors
2. BHS handling devices
3. Gear reducers
4. Bar Code scan guns
5. Bearings
6. Pulleys and rollers
7. Motorized pulleys
8. Clutches and Brakes
9. Chains and sprockets
10. Belts and Sheaves
11. Gear reducers
12. Queue conveyors

13. Merge conveyors
14. Power turns
15. Fire/security doors and Draft curtains
16. SS inspection tables and associated peripheral mounts
17. Computers and peripheral devices
18. HMIs
19. MCPs
20. Remote I/O Panels
21. PLCs and associated equipment
22. UPSs
23. Soft starts and/or VFDs
24. Control devices
25. Wiring devices
26. Graphical displays, monitors and mounting brackets
27. Lift Gates
28. Additional items that are included with the final BHS design

1.12.7 Mechanical Shop Drawings

a) Shop drawings shall be submitted for approval, prior to fabrication. The shop drawings shall include verification of tug lane head room clearances. The contractor is responsible for coordination and conflict identification prior to installation. Any costs associated with conflict mitigation which was not identified prior to installation will be borne by the contractor.

b) BHS layout plan with dimensions, section and elevation drawings of the system (that are keyed to the layout) with components tied to the bill of materials list, with building and other systems shown (in the background) for reference and coordination.

c) The overall mechanical system layout shall include building structure and interferences, building penetrations and/or modifications, motor locations, catwalks, crossovers, and clearances. Any building interferences and design deviations shall be clearly identified in the BHS contractor submittal.

d) Mechanical drawings shall contain BHS contractor's drawings, etc. and shall include the following at a minimum:

1. Drawing index
2. System layout drawing including existing conditions, final conditions and phases including necessary demo.
3. Details and dimensions of all equipment (plan, elevation, and sections)
4. Clearances both horizontal and vertical as related to the building structure
5. Demo drawings when applicable
6. Interferences
7. Tug routing
8. Dimensions and details, of any required building preparations or modifications

9. Location and dimensions of conveyor drives.

e) The BHS contractor shall provide “signed and sealed” drawings and documents by a licensed Professional Engineer (PE) registered in the state in which the system shall be installed, for any drawings, calculations, and submittals required per the Owner (or OAR).

f) Provide the general arrangements with dimensions (plan, elevation, details and sections) of all mechanical equipment including but not limited to:

1. Baggage conveyors and other baggage handling equipment
2. Fire/Security doors
3. Maintenance platforms and catwalks
4. Crossovers
5. Ladders and/or stairs
6. Impact protection
7. Safety signage

g) Provide drawings of the BHS maintenance access catwalks, ladders, stairs, ship’s ladders, crossovers, panel locations and details to ensure components can be safely and easily accessed and maintained.

h) Provide detail drawings of drive, take-up, end roller and break-over assemblies. Provide detail drawings of stainless steel conveyor shrouding and/or custom equipment and any other details that may be necessary and/or requested by the Owner (or OAR).

i) The contractor shall submit a detailed BHS motor schedule for the new and/or modified conveyors. The BHS motor schedule shall include the following:

1. Equipment ID
2. Equipment type, (queue, transport, power-turn, etc.),
3. Conveyor centerline length
4. Elevation change
5. Motor horsepower
6. Motor type. (Clutch/Brake, VFD, etc.)
7. Service Factor
8. Reducer Ratio
9. Voltage
10. Nameplate amperage (FLA)
11. MCP, source of power feed, Circuit breaker size

j) Structural Attachments

1. Submit structural attachment detail drawings and the design computations of all structural supports for the new and/or modified portions of the BHS and associated platforms and/or walkways “signed and sealed” by a registered Professional Engineer (PE) licensed in the same state or jurisdiction of the work.

2. Submit for review, the design and locations of all structural attachment points, wherever the equipment shall be supported by the building structure. Identify (as a minimum) the type of anchor device to be used and the amount of load to be imposed.
3. Submit a complete vibration isolation drawing package, showing isolation type, as well as method and location of installation.
4. The BHS contractor shall submit structural, vibration isolation and seismic detail drawings and calculations for all attachments and supports used on the BHS equipment or access platforms. This shall include a certification that the existing infrastructure can accommodate the BHS equipment loading.
5. Provide the location, type and load of the supports and lateral bracing, and additional steel members, necessary to support conveyors.
6. Identify the method of attaching the conveyors to the structure or floor. The load points and load amount to be supported by the existing structure shall be evaluated and confirmed by the BHS contractor and approved by the Owner (or OAR).
7. Provide the front, side and section views of all conveyor components. Show the location, dimensions and rating of conveyor drive units. Indicate the method of attaching adjacent conveyor sections.

1.12.8 Electrical Shop Drawings

a) Electrical drawings shall contain the following at minimum:

1. Power source identification and sizing
2. Schematics of each MCP
3. Field control wiring schematic
4. VFD settings
5. Remote panel schematics
6. Power requirements
7. Interior and front panel layout of MCPs
8. Pushbutton station layout
9. Location of all controls field devices
10. Estop zoning layouts
11. Conduit types and sizes
12. Wire sizes and numbers
13. Demo drawings and procedures where applicable

b) Reference Electrical Specifications for additional requirements of the following:

1. MCPs
2. Control devices
3. Control stations
4. Beacons and horns
5. Stack lights
6. Remote alarms
7. Motors

8. Motor safety disconnects switches
9. Photoeyes
10. Shaft mounted encoders
11. E-Stops

c) BHS detailed electrical shop drawings shall be provided for the following:

1. Photoeye schedule
2. System interfaces
3. Integration flow charts
4. Wiring diagrams
5. Networked components (if required)
6. Associated displays
7. Related control devices
8. MCP locations
9. Computer and/or PLC architecture diagrams
10. Motor schedules (include motor horsepower, frame size, full load amps and speed).

d) The BHS contractor shall provide an overall control system architectural diagram clearly identifying both upper and lower level controls with respective data communication networks; at a minimum all system PLCs (for the security screening requirements, automated sortation, tracking and system status), all computers/PLCs with functions of each clearly identified (i.e.: sortation, GUI), printers, UPS', switches (Ethernet, serial), Drivers, ATR Scanner Arrays and all associated array components (i.e., tachometer boxes, photocells, multiplexers), Bag Status Displays, Manual Encoding Stations, proposed networking for servers, MIS/MDS and associated workstations. Additionally, submit a schematic diagram with an outlined description that will clearly define the approach that will be taken to satisfy the specified requirements for BHS redundancy.

e) The BHC System submittals shall also include an application matrix interconnection diagram of the complete BHC System along with a comprehensive list of ports/protocols relative to source and destination for each system communicating on the BHS network(s). The network submittal shall include an IP address schedule.

f) The contractor shall provide demo drawings and instructions whenever the project work involves disabling portions of a conveyor/control system. These drawings and instructions shall contain all information required to accomplish this work safely and keep the remaining systems operating as required.

g) The BHS contractor shall provide signed and sealed drawings and/or documentation by a Professional Engineer registered in the state or jurisdiction in which the system is installed for the following items if applicable:

1. New and/or existing modified BHS motor control panel connected load calculations
2. Any drawings, calculations, or submittals required per the federal, state, or local codes

h) Provide two (2) ANSI “B” size copies of the electrical schematic wiring diagrams for placement in each associated MCP.

1.12.9 Functional Specification

i) Provide a macro level process/bag flow description as well as a detailed functional description of each BHS conveyor subsystem.

j) Functional Specification shall contain Human Machine Interface Terminal (HMI) screens/menus for each associated system and/or subsystem and a complete description of its operation and equipment monitored.

k) BHS Physical Description - Provide a physical description of the overall conveyor systems, identifying the following:

1. Each conveyor subsystem
2. Location of primary components
3. Operator controls
4. Accessory components

l) BHS Electrical Description - Provide a description of the following:

1. Motor Control Panels
2. Programmable Logic Controllers
3. Operator Interface Terminals
4. Baggage Status Displays
5. Control Stations
6. Operator control devices
7. Encoders
8. Photoeyes
9. Limit Switches
10. Audio and visual alarms

m) Reference the specific drawings for each electrical control schematic.

n) Specifically identify CBRA functionality and operating procedures in written format for future TSA and airport use and publishing. The procedures should be very detailed, with pushbutton usage and order of operations, bag movement and process flow considerations.

o) Provide safety precautions to be followed by operating personnel, to include but not limited to:

1. Start-up
2. Shutdown
3. Oversize detection

4. Out-Of-Gauge
5. Jam detection
6. Overload / MPS
7. Motor Safety Disconnect
8. Emergency Stop procedures

1.12.10 Factory Acceptance Test Documentation

a) Submit an agenda for the Factory Acceptance Test (FAT) listing of the various tests to be performed and expected dates and durations of each. This agenda shall be provided to all attendees in advance of the FAT.

b) Submit a factory acceptance test plan based on the functional and SSTP test to be done on-site. It is expected that all functionalities will be factory tested and the documentation of results be available for review by the owner. The tests performed for the FAT demonstration will be a limited, having only a subset within each functional testing category, while including all critical system tests. Submit a test plan for the FAT for submittal to be used at the FAT demonstration.

1.12.11 SSTP and Documentation

a) Submit the following completed and approved for construction documentation. These documents will be forwarded by the BHS contractor to the TSA's IV&V representative for the project:

1. BHS/CBIS Controls System Descriptions that shall include all subsystem Controls Descriptions of Operation (Detailed Functional Specifications).
2. BHS / CBIS Drawings illustrating Control Station locations, field control components and conveyor numbering.
3. Example MIS statistical reports that will be available during the Pre-TRR, TRR and ISAT periods.
4. BHS/CBIS Redundancy schematic diagrams
5. BHS/CBIS E-Stop Zone Drawings
6. BHS/CBIS Mechanical Drawings including Plan and Elevation Views
7. BHS / CBIS Conveyor Motor Manifest
8. Phased Implementation Plans with associated Narrative and Drawings
9. Construction and Testing Schedule
10. Site Specific Test Plan (SSTP), based on the above documentation

b) The above referenced documents shall be submitted to the owner, with accompanying cover letter, stating the purpose of this submittal. All accompanying drawings shall be clearly visible and legible when plotted on "D" size stock. All documents shall be submitted in both hard and soft copies in native format (such as, but not limited to, text documents in MS Word and PDF format and drawings in AutoCAD [.dwg or .dwf] and PDF format.).

1.12.12 Test & Inspection Program

a) The BHS Test & Inspection Program shall be submitted for the Owner's (or OAR's) review and approval. The BHS contractor shall assume the responsibility to meet with the Owner (or OAR), to review the "Test Plan" and ensure the BHS meets all the requirements.

b) The BHS contractor shall submit test plans including the procedures for conducting Static Inspections, Dynamic Observations, Load testing and Functional testing.

c) The BHS shall provide a Functional Test Plan submittal shall include tests that are based on the BHS description of operation. The Functional Test Plan shall identify and demonstrate all system control functions relating to the operational, functional and system performance tests. The Functional Test Plan is to list each control station, and control device, and its related control function that is to be demonstrated/tested. The Functional Test Plan shall contain testing for proper interfacing and function of integrated systems such as fire systems, security systems, EDS and other systems.

d) A Certification of Test Compliance shall be provided by the BHS contractor, and signed by the Owner (or OAR), after the system is proven to be acceptable and in compliance with all the testing requirements and specifications.

e) Refer to the acceptance and testing section of this specification for detail test plan content requirements.

1.12.13 Warranty

a) Submit two (2) draft copies on approved electronic media of the BHS warranty for the complete operating Baggage Handling Systems, 60 days prior to beneficial use (for the Owner's review).

b) Refer to Section 1.13

1.12.14 Estimated Spare Parts List

a) Submit the BHS recommended electrical and mechanical critical spare parts lists to include at a minimum:

1. Item Number
2. Description (i.e. size, measurement, revision, etc.)
3. Manufacturer
4. OEM part number (not BHS contractor internal number)
5. Quantity by subsystem
6. Overall total system quantity
7. Recommended spare inventory level
8. Criticality level
9. Item cost at time of project purchase
10. Lead time

1.12.15 O&M Manual

1.12.15.1 O&M Manual Purpose

a) The main purpose of the “O & M” manual shall provide the Owner’s “Operational” and “Maintenance” personnel with the following:

1. A thorough understanding of the layout of the BHS
2. MCP and Control Station locations
3. The BHS functions
4. Special features
5. Operational requirements
6. Maintenance requirements
7. Parts information
8. Warranty information
9. Safety considerations
10. Operating and maintaining the BHS safely and effectively

b) This specification section is intended as a guide to indicate the basic requirements of the O&M manuals.

c) The BHS contractor’s standard O&M manual shall only be acceptable if the systems are functionally equivalent to that specified, and the documents are appropriate and usable for the intended purpose.

d) The O&M manual shall contain only the equipment and functions used in this project.

1.12.15.2 The O&M manual shall be divided into two main sections:

a) The “Operational” portion of the manual shall present the information required for personnel to be able to operate the system in a safe and efficient manner. The Operational information shall be presented in easy to understand terms, to ensure that personnel not familiar with the system shall have a thorough understanding of the system upon reading the operational information.

b) The “Maintenance” portion of the manual shall present the information required for personnel to be able to maintain the system in a safe and efficient manner. The Maintenance information shall be presented in easy to understand terms, to ensure that personnel not familiar with the system shall have a thorough understanding of the mechanical and electrical equipment operation and maintenance requirements, so that they shall be able to perform maintenance functions effectively and safely such as:

1. Inspection
2. Troubleshoot
3. Service
4. Repair
5. Replace

1.12.15.3 Binder Type

a) Binders shall be of the “presentation” type equipped with “D” rings.

b) The binders shall be equipped with a clear spine pocket to permit the insertion of the manual title.

1.12.15.4 O&M Manual Format

a) The O&M manual shall be contained within at least two (2) volumes of appropriate size. Note that additional volumes may be required to accommodate multiple operational and/or maintenance information chapters.

b) The title information shall be generally as follows:

1. First line: Three letter code of the Airport in which the system is located.
2. Second line: “Operations Manual” or “Maintenance Manual”
3. Third line: “For”
4. Fourth line: Type of system: (such as: Airside __; Outbound Baggage Handling System)
5. Fifth line: Date of System, as based on actual Beneficial Use date
6. Sixth line: Project Number (to be Coordinated with the Owner)

c) A "Record of Revisions" sheet shall be provided at the beginning of the O&M manual.

d) A Table of Contents shall be provided at the beginning of the O&M manual.

e) Each chapter shall be identified with an index tab with permanently printed information. Each chapter of the O&M manual shall begin with an index for the related chapter.

1.12.15.5 Operational Information

a) Glossary of Operational Terms shall include a glossary of operational related terms and equipment identification/designations.

b) System Overview shall include, at a minimum, the following items:

1. A basic overview of the system showing overall layout and arrangement.
2. Identify locations, number of and types of inputs.
3. Identify locations, number of and type of sort areas (as appropriate).
4. Identify system and subsystem conveyor designations.
5. Processing rate of each subsystem as well as the total system-processing rate.

c) Baggage Weight and Size Limitations shall include, at a minimum, the following items:

1. Normal Size Baggage

2. Overheight Baggage
3. Overlength Baggage
4. Out of Gauge Baggage
5. Baggage that can be processed by system, but requires special considerations or handling, such as skis, golf bags, etc.
6. Airline Baggage Hygiene Policy

d) Detailed Description of System Operation shall include, at a minimum, the following items written in a clear concise manner:

1. The detailed operational description of system operation shall be written to provide operational personnel a thorough understanding of how to operate the system.
2. Operational personnel include: Passenger Service - Ticket Agents, Screening staff, Airline Baggage Handlers, BHS Operators, BHS contractor.
3. The operational information shall cover system start-up and shut down requirements.
4. The operational information shall also provide a thorough understanding of the system “Fault Annunciation” so that faults can be recognized and immediate appropriate action can be directed.
5. The operational information shall provide an operator's troubleshooting guide for the safe and effective correction of operational problems.
6. The operator’s information shall also include procedures and recommendations for a contingency plan (if required) due to various equipment or subsystem failures.

e) Operational Safety shall provide safety information related to the proper and safe operation of the specified system and its equipment from an operator's point of view, and at a minimum shall cover the following items (this list is not to be construed as being complete since it is provided only as a guide):

1. Pre-operating Procedure
2. Start-up and Shut-down Procedure
3. Jam Detection, Clearance and Restart Procedure
4. Oversize Detection, Clearance and Restart Procedure
5. Emergency Stop and Restart Procedure
6. Motor Safety Disconnects
7. Lock-Out/Tag-Out Procedure

1.12.15.6 Maintenance Information

f) Glossary of Terms and Identification shall include a glossary of all associated terms and equipment identification/designations used with the specified system.

g) Description of System Equipment shall include, at a minimum, the following items:

h) Detailed description of the mechanical conveyor equipment used in the system including widths of conveyors, general specifications and capabilities of the system.

i) Detailed description of the electrical equipment used in the system, including the location of Motor Control Panels (MCPs), PLCs, fire/security doors, etc.

j) Electrical Control Sequence of Operation shall include a detailed description of the electrical control sequence of operation. The detailed description shall cover the following items (this list is not to be construed as being complete since it is provided only as a guide):

1. Control Stations
2. Photoeyes
3. Encoders
4. Motor Safety Disconnects
5. MCPs
6. PLCs
7. HMIs (if required)
8. Fire/Security Doors

k) Maintenance Safety Procedures shall provide safety information related to the proper and safe operation and maintenance of the specified system and its equipment from a maintenance point of view, and at a minimum, the following items shall be covered (this list is not to be construed as being complete since it is provided only as a guide):

1. Pre-operating Procedure
2. Start-up and Shut-down Procedure
3. Emergency Stop and Restart
4. Jam Detection and Restart
5. Oversize Detection and Restart
6. Motor Safety Disconnect
7. Lock-Out/Tag-Out Procedure

l) Service, Inspection and Preventive Maintenance shall provide detailed information for the proper servicing of all of the system equipment and at a minimum shall cover the following (this list is not to be construed as being complete since it is provided only as a guide):

1. A general explanation, regarding what the servicing requirements are for the related system equipment.
2. Provide a List of Lubricants for each BHS component including the lubricant type, rating and manufacturer if applicable.

3. Detailed preventive maintenance program outlining required functions and frequencies for the proper preventive maintenance of the components that make up the system equipment items such as:
    i. Load Conveyors
    ii. Transport Conveyors
    iii. Queue Conveyors
    iv. Power Turns
    v. 45 Degree Merges
    vi. Fire/Security Doors
    vii. Motor Control Panels.
4. It shall be noted that the information (i.e. cut sheets) shall be "brand specific" for the actual equipment provided for this system only. Information for equipment types and brands that are not provided in this system shall not be acceptable.
5. At a minimum, the following items shall be covered, however; this list is not to be construed as being complete since it is provided only as a guide.
6. Inspections for:
    i. Straight Conveyors
    ii. Queue Conveyors
    iii. Power Turns
    iv. Merge Conveyors
7. Lubrication of:
    i. Motor Bearings
    ii. Pulley Bearings (as required)
    iii. Drive Chains
    iv. Speed Reducers
    v. Power Turn Perimeter Chains and Guides
8. Cleaning of:
    i. Motors
    ii. Drive Chains
    iii. Speed Reducers
    iv. Photoeyes (and related reflectors),
    v. Motor Control Panels
9. Adjustment of:
    i. Straight Conveyor Belt Tracking
    ii. Straight Conveyor Belt Tensioning
    iii. Power Turn Conveyor Belt Tracking and Tensioning
    iv. Merge Conveyor Belt Tracking and Tensioning
    v. Drive V-Belt and Sheave Alignment

vi. Drive V-Belt Tensioning
vii. Drive Chain and Sprocket Alignment
viii. Drive Chain Tensioning
ix. Drive Motor Clutches
x. Drive Motor Brakes
xi. Photoeye alignment and sensitivity adjustment

m) Warranty Information and Procedures shall provide detailed information regarding the specific Warranty Conditions that prevail on the specified system. The detailed information regarding the system warranty shall include the following:

1. Date of Beginning and Expiration of Warranty Period.
2. Specific instructions regarding the procedures for the documentation and return of items under warranty.
3. Names and phone numbers of the "point of contact" for warranty questions and discussions.
4. Note that the "point of contact" information shall be provided for both "normal" 0800 to 1700 Monday through Friday hours as well as "after hours".

n) Troubleshooting shall provide detailed information for the proper troubleshooting of the system equipment. At a minimum, the following items shall be included in a detailed "problem and correction" type of troubleshooting chart (this list is not to be construed as being complete since it is provided only as a guide):

1. All mechanical equipment
2. All electrical equipment
3. All control equipment
4. All computer equipment

o) The troubleshooting information provided in the chart shall cover an exhaustive list of possible causes of system failure or malfunction. The information shall be arranged in a three (3) - column format with respective headings of:

i. Trouble
ii. Probable Cause
iii. Corrective Action

p) Empirical Readings: This chapter shall include the Empirical Readings, (as noted in “Testing and Acceptance” section of this Specification) that were recorded at the time of the Conditional Acceptance Testing and Inspection of the system. This information shall be provided as maintenance reference documentation.

q) Removal and installation procedures: The BHS contractor shall provide adequate detailed information for the proper removal and installation of all

of the system's equipment and components (i.e. conveyors, power turns, and fire/security doors).

1. It shall be noted that the information shall be "brand specific" for the actual equipment and components provided for this system.
2. Information for equipment and/or components, types and brands that are not provided in this system shall not be acceptable.
3. At a minimum, the following information shall be included in this chapter (this list is not to be construed as being complete since it is provided only as a guide):
   i. Basic Considerations
   ii. Safety Precautions
   iii. Procedural Orientation
   iv. Torque Values (electrical and mechanical)
   v. V-Belt Tension Procedures and Values
   vi. Drive Chain Tension Procedures and Values
   vii. List of special tools, gauges and equipment required for the maintenance of the system, together with illustrations and instructions as to how they are to be used. Sources for procurement of these items shall also be provided.
4. Component List
   i. Straight conveyors
   ii. Power turn conveyors
   iii. Merge conveyors
   iv. Queue conveyors
   v. Fire/security doors
   vi. Motor Control Panels (MCP's)

r) Illustrated Parts Information shall contain detailed illustrated parts information. The illustrated parts information shall be provided for all mechanical and electrical equipment.

1. Clear, concise, exploded view, isometric drawings showing all the parts, the relationship of adjacent parts with one another, as well as the diagram number that shall reference the specific part on the adjacent parts information sheet.
2. The parts information sheet shall be adjacent to the isometric drawing and shall contain:
   i. Part reference number from isometric drawing
   ii. Part description
   iii. Part Number
   iv. Manufacturer of part
   v. Number of parts found in the conveyor equipment isometric drawings

3. Provide the above information in a manner so that the isometric drawing (up to 11" x 17", that can be folded up) shall be on the left-hand side of the open manual, with the associated parts information sheet as the right-hand page of the open manual.
4. Include model and serial numbers for all special equipment such as fire/security doors, power turn conveyors, etc.

s) Manufacturer's Literature: Shall provide all of the manufacturer's literature for all of the conveyor equipment (mechanical, electrical and electronic components).

1. It shall be noted that the information shall be "brand specific" for the actual equipment and/or components provided for this system only. Information for equipment and/or component types and brands that are not provided in this system shall not be acceptable.
2. Only a first copy of the manufacturer's original literature shall be accepted if the actual original manufacturer's literature cannot be provided.
3. All such copies shall be clear and legible.
4. Preferably, print the manufacturer’s cut sheets (pdf format) from the internet, as needed.
5. All manufacturers’ literature shall be appropriately highlighted with a legible solid arrow for identification of the specific model (or type of device) used in the specified system.
6. All manufacturers’ literature shall include information adequate for proper servicing of the item, proper operation of the item, as well as all required information for the ordering of the item.
7. Provide a complete list of parts manufacturers including website, address, telephone number, point of contact, phone number, e-mail address, etc.

t) Mechanical Drawings: This chapter shall contain a complete, clear and legible 11" x 17" set of "As-Built" BHS mechanical drawings.

1) The 11" x 17" drawings are to be folded so that they shall fit within the O & M Manual.

u) Electrical Drawings: This chapter shall contain:

1. A complete list and definition of the electrical symbols used in the electrical drawings.
2. A complete, clear and legible 11" x 17" set of "As-Built" BHS electrical drawings. The As-built drawings shall contain as a minimum the following:

i. Detailed wiring connection drawing noting each control device, control station, motor, etc., in block form with a detail of the actual "field wiring" numbers and configuration.

ii. Detailed conduit routing diagram indicating size of conduit, size and number of conductors, junction boxes, control devices, motors, and safety disconnect switches, motor control panels, etc.

iii. Detailed block diagram representing internal layout of components within each motor control panel, both internal as well as external layout of components.

iv. Schematic Wiring Diagram of each MCP, including outline and wiring diagram of all special devices.

3. An additional approved 11" x 17" reduced copy shall be placed in the door pocket of the MCP.
4. The 11" x 17" drawings are to be folded so that they shall fit within the O & M manuals.

v) Software Listings – Provide a complete list of operating systems and software packages used in the project. Provide versions and any other pertinent information required for replication.

1.12.16 Training Plan

a) Submit a detailed “BHS Training Plan” outline and course material. The Training Plan submittal shall include the following:

1. Course Outline including major topics of discussion and approximate durations of each.
2. Course materials
3. Course proposed schedule (dates and times)
4. Location requirements
5. Course intended audience (airline personnel, maintenance and TSA)

1.12.17 Closeout Documentation

a) Provide all closeout documentation for the BHS system in accordance with the requirements, upon final completion and acceptance of the system by the Owner (or OAR).

b) The BHS contractor shall submit to the Owner (or OAR) via the General Contractor (GC) the following documents:

1. Test documentation
2. Final completed punch list
3. Final O&M - two (2) hard copy and two (2) soft copies
4. Two (2) hard copy and two (2) soft copy as-built electrical and mechanical drawing sets to the owner,
5. One (1) hard copy 11x17 as-built electrical drawing set in the applicable MCPs.

c) The BHS contractor shall submit to the Owner (or OAR) via the General Contractor (GC) the following as-built documents, unless otherwise specified, in

electronic copies in their native software file format, i.e. “acd”, “dwg” format and searchable bookmarked PDF.

6. Final Description of Operations
7. Mechanical Drawings
    - Cover Sheet & Index
    - Legend
    - Overall Plan View
    - Overall Plan Existing
    - Isometric (if 3D)
    - CBRA Egress Plan
    - ETD Egress Plan
    - EDS Removal Path
    - ETD Plan View (1/2” scale if possible)
    - CBRA Plan View (1/2” scale, if possible)
    - Flow Chart
    - Standard Details
    - 1/8” scale plan views
    - 1/4" scale elevation views
    - Catwalk Drawings
    - Structural attachment drawings (including load drawings)
    - Structural Details
    - Phasing Drawings
8. Electrical Drawings
    - Cover Sheet & Index
    - Legend
    - Manifest with power summary and belt speeds
    - Control Device Plans 1/8” scale
    - E-Stop and Failsafe Zones
    - I/O and Device Wiring Diagrams
    - MCP Exterior and Interior Layouts
    - Control Device and Remote Enclosure Details
    - Network Diagrams Lower Level (PLC)
    - Network Diagrams Upper Level (Sort and MIS/MDS)
9. The PLC program including lower level network files.
10. The Upper Level (Sort and MIS/MDS) programs source files
11. HMI software documentation and source programs
12. PLC, Network and Software disaster recovery procedures including, but not limited to the following:
    - Documentation containing circumstances and procedures for recovering the PLC, Lower an Upper level networks, MDS/MIS applications and data, BSDs, ATRs, BMAs and workstations in a disaster situation.

- Software recovery applications and recovery procedures.
- Instructions for restoring network operation, network configuration and security settings.
- Procedures for recovery from hardware failure such as communication hardware, memory, and disk drive failures.

d) Electronic File Naming Conventions - The electronic file names shall conform to the following convention:

ABC_XXXX_LOCATION_MMDDYYYY_TYPE_DESCRIPTION.EXT

1. ABC is the FAA airport identifier
2. XXXX is the International Air Transport Association (IATA) airport identifier
3. LOCATION is a unique description of the project location such as T1, NODE1, etc.
4. MMDDYYYY is the file date represented as month, day, and year utilizing leading zeroes where applicable
5. TYPE is the file type as follows:
   - NARR is a narrative
   - PLC is a PLC program
   - NET is a network configuration
   - DWG is a drawing
   - VFD is a VFD configuration
   - IDX is an index
   - HMI is an HMI configuration
   - LIST is a spreadsheet list
   - FIRM is a firmware listing
6. DESCRIPTION is a free text field to describe the file contents
7. EXT is the file extension

e) A Control System Architecture Overview shall be submitted that follows the requirements of the PGDS v7.

1. Summary - A descriptive summary narrative of the submittal shall be included in Microsoft Word and PDF format. This summary shall include, at a minimum, the following information:
   - Airport name and area of the airport included in the submittal such as terminal, matrix, node, etc.
   - Description of the included area including:
     i. Number and type of EDS units
     ii. type and quantity of infeed conveyor systems such as ticket counter sub-systems, curbside sub-systems, mainlines, etc.
     iii. type and quantity of outfeed conveyor systems such as mainlines to sort piers, makeup units, etc.
   - Description of the conveyors / sub-systems and their controller

equipment. At a minimum, the following information shall be provided:

i. List of each PLC and the conveyors / sub-systems it controls

ii. List of each MCP and the conveyors / sub-systems it controls

- Contact information for:

i. Airport director, engineering manager or other primary contact point responsible for this CBIS

ii. Airline(s) primary contact for this CBIS

iii. Operation and/or maintenance contractor (if applicable) primary point of contact

iv. Point of contact responsible for follow-up submittals

2. Index - An index of the documents included in the submittal shall be included. This index shall be submitted in Microsoft Excel and PDF format. The index shall include, at a minimum, the title of each file, the file date and the electronic file name.
3. Control System Architecture Drawing - A control system architecture drawing shall be summated for each CBIS. This drawing shall be submitted in DXF and PDF format. All high and low level networks shall be included. Detail shall be down to the motor control panel or PLC chassis level for high level networks; photoelectric cell (PEC) and/or device for low level networks. Configuration information such as node numbers and IP addresses shall be included. Multiple drawings by different network types will be acceptable provided a high level overall drawing is provided. This information may be segregated by airport, terminal, matrix or other functional level to correspond with individual projects.
4. PLC Code and Associated Configuration Information - The low level, or PLC control, submission shall include the following at a minimum.
   - PLC Program: A copy of the PLC program shall be submitted in its native format for all PLCs included as a part of the CBIS. In the event multiple levels of PLCs are utilized all programs are to be included. This shall include any redundant PLCs that may exist. All software keys and or passwords shall be provided if programs are protected and or locked in some way.
   - Network Configuration: A copy of all network configuration files shall be submitted in its native format. This shall include any redundant networks that may exist.
   - Variable Frequency Drive (VFD) Configuration: A copy of the configuration of each VFD (including any firmware information) in the CBIS shall be submitted in its native format. The configuration submittal shall include all parameters including unchanged or default settings.
   - Communication and Other Controllers: A copy of the configuration and/or code for all other devices as a part of the control system shall be submitted in its native format. An example of these devices might

be co-processors or multi-vendor interfaces.

- Firmware Configuration: A spreadsheet listing all control devices and their associated firmware levels, where firmware is used, shall be submitted. This spreadsheet shall be submitted as both a Microsoft Excel document and as a PDF file. All devices which have firmware shall be included. Examples of these devices are PLC chassis, PLCs, I/O modules, Network modules, Communication modules and VFDs.

5. HMI Configuration - A copy of all HMI configurations shall be submitted in their native format. Examples of these HMIs are control room graphical display systems, operator interface panels, bag display monitors or any other computer or dedicated display modules.
6. High Level Computer Configuration - A descriptive narrative of the high level computer equipment of the CBIS shall be submitted in Microsoft Word and PDF format. Included in the narrative shall be a description of each computer and the function/task of the computer. Any data exchange between any computer and/or PLC that controls or affects bag decisions shall be included. In addition, the narrative shall describe the results of any computer failure and the ability of the CBIS to continue screening baggage.
7. Programming and Configuration Software - A spreadsheet listing all programming and configuration software with the revision level used shall be submitted. This spreadsheet shall be submitted as both a Microsoft Excel document and as a PDF file. Examples of this software are PLC programming software, network configuration software, HMI configuration software and multi-vendor interface programming / configuration software.
8. CBIS/ISAT Benchmark Data - A descriptive summary narrative of the system status at time of submittal shall be included in Microsoft Word and PDF format. This summary shall include, at a minimum, the following information:
    - Scan time for each PLC, average and maximum
    - Memory utilization for each PLC
    - Network utilization for each network, high and low level networks. Where deterministic networks with set update times are used provide all settings and times.
9. Change Summary Log - A log of all changes made to the CBIS post-ISAT shall be maintained. The log shall be an itemized list of all the implemented and pending changes to date. This log shall be included in all submittals after its creation. The log shall include the following data at a minimum:
    - CBIS designation
    - Name of Change
    - Description of change
    - Status of change (i.e., in testing, operational, pending, etc.)
    - Date of TSA approval
    - Date of live operational use

f) The BHS contractor is responsible to respond to and correct any submittal comments made by the OAR or TSA. These rectifications should be accomplished and coordinated with the OAR and TSA and finalized by the BHS Contractor for proper closure.

1.12.18 Design and Construction Phase Weekly Updates

a) The BHS contractor shall provide weekly updates of the master schedule.

b) If the BHS contractor is fourteen (14) or more calendar days behind the original approved Master Schedule, then a recovery plan shall be submitted.

c) Design and Construction Phase weekly updates shall include:

1. Status payments
2. Status of RFIs/RFSs
3. BHS engineering issues
4. Equipment interface issues
5. Installation Issues
6. Tasks & deliveries for the following week
7. Right of ways
8. Building interface (i.e. facility fire alarm, security access control systems)
9. Coordination issues
10. Percentage of testing complete
11. Phasing plans and two week look ahead
12. Overnight Tie-ins
13. Temporary construction requirements

1.13 BHS WARRANTY

1.13.1 General

a) The BHS standard equipment warranty period shall be 12 months for the complete operating Baggage Handling Systems for defective materials and workmanship from date of beneficial use for each subsystem (as specified herein). Provide alternate quote for 3 year warranty.

b) If these warranty provisions conflict with other required warranties within the overall project documents and specifications, the more stringent (as determined by the Owner) shall apply.

c) The BHS contractor shall transfer all warranties to the Owner for materials and equipment received from subcontractors and suppliers.

d) The BHS contractor shall warrant existing relocated and/or reused and refurbished BHS equipment for 12 months against defective parts and labor. This warranty shall not include non-refurbished and non-relocated BHS equipment.

e) The BHS contractor shall agree to repair or replace any defective materials and associated workmanship during the warranty period.

f) Defective materials and workmanship are considered to include occurrences such as but not limited to:

1. Unsafe conditions
2. Operational failures
3. Unusual conditions
4. Unexpected conditions
5. Unsatisfactory conditions
6. Performance below the minimum requirements
7. Excessive deterioration
8. Excessive aging
9. Excessive noise
10. Excessive vibration
11. Abnormal wear

g) If any of the above defects occur within the warranty period, the BHS contractor shall repair or replace the defective items and assume the full costs of labor and materials. The BHS replacement items shall be new and meet the requirements of this specification.

h) The BHS contractor shall provide “on-site” mechanical and electrical technical support, and on-call PLC and software support for a period of 14 days starting on the date of Substantial Completion, and “on-call” technical support for a period of 14 days thereafter. These time frames shall apply when multiple Substantial Completion dates or phases are required by the Contract Documents or the work.

1.13.2 Controls Warranty

a) The BHS and associated equipment shall be capable of functioning for a minimum of 10 years.

b) All the BHS industrial computer equipment and peripherals shall be available to purchase for warranty and/or maintenance replacement for a duration of three (3) years.

c) All the PLC, and HMI components shall be available for three (3) years.

d) If the BHS contractor cannot adhere to the above listed conditions, they shall provide alternative sources of suppliers. The functionality and compatibility of the BHS spare parts list (from an alternate source) shall be provided by the BHS contractor.

1.13.3 Design Warranty

a) The BHS contractor shall provide a warranty against any “Design Failure” for five (5) years (beginning at “Final Acceptance”) which states:

1. The BHS, equipment, materials, software, and controls (furnished and/or installed) shall be free from faults or defects in design.
2. The BHS shall conform to the functional and technical requirements of the Contract Drawings and specifications. The BHS shall comply with all the applicable laws, statues, ordinances and codes.
3. The BHS contractor shall provide the Owner a design warranty guaranteeing the design application and overall system integration of the BHS components, sub-components, sub-assemblies and parts utilized are free from faults, patent infringements and defects in design, application and/or integration.

1.13.4 Parts and Labor Warranty Terms

a) The BHS contractor shall be required to supply a “Parts and Labor” warranty, which states that the BHS contractor shall proceed with and perform the work in the best and most workmanlike manner.

b) The “Parts and Labor” warranty shall state that the BHS contractor conforms to all the applicable laws, statutes, ordinances and codes, and that the BHS is suitable for the intended use.

c) The BHS warranty shall state that the technical requirements and functionality (as specified in the contract documents and specifications) have been complied with.

d) Any equipment, parts or materials that were taken from the Owner’s spare parts inventory (to complete warranty service work) shall be replaced by the BHS contractor (within two weeks of removal notification).

e) The BHS materials and equipment that are provided and/or installed, shall be new and free from defects in materials, workmanship, detail or incorrect selection.

f) Any BHS equipment, parts or materials that have excessive wear shall be considered a defect.

1.13.5 Period and Responsibility

a) If within the warranty period, the work, the system, or any piece of equipment or material is determined to not conform to the warranty, then the BHS contractor shall (within 24 hours of the notification), commence work to correct, repair or replace the defect and/or design flaw.

b) The Owner (or OAR) may decide to perform the normal warranty labor for repair work with their own maintenance staff and parts, (at the BHS contractor's expense).

c) All the details of any warranty work to be performed by the Owner (or OAR) shall be negotiated between the Owner (or OAR) and the BHS contractor, (prior to the commencement of the work).

d) The BHS contractor shall provide all the labor and parts for work related to the warranty claim, whether corrected by the owner or contractor during the warranty period.

e) Any replacement parts that are required shall be shipped, "freight pre-paid", to the location specified by the Owner (or OAR).

f) Any failed and/or malfunctioning parts shall be returned to the BHS contractor within ten (10) days of the notification of detection.

1.14 SAFETY

1.14.1 General

a) The BHS contractor shall guarantee that all of their systems and associated components satisfy all the legal safety requirements, (required by associated governing agencies). All safety measures shall be in accordance with and follow (federal as well as local) OSHA and/or other safety regulations.

b) All safety measures shall protect the working staff of the BHS from injuries. This includes work platforms and tug & dolly ram protection, as well as all other areas of the BHS where only the maintenance staff has access.

c) The BHS contractor is fully responsible to investigate and incorporate into their design, any additional safety features and/or requirements which may be required.

1.14.2 System Safety

a) The BHS contractor shall utilize control methods and techniques, circuitry, mechanical and electrical equipment and operating and/or maintenance procedures to provide maximum safety for operation and maintenance personnel. This shall also minimize potential damage to the equipment and to the baggage being processed.

b) Incorporate fail-safe techniques to prevent the occurrence of unsafe conditions, which could result from an equipment failure or improper implementation of the operating procedures.

c) As employed herein, the fail-safe principle shall be interpreted as follows:

1. In the event an equipment failure or external influence such as improper operation, high temperature, power failure, or other adverse condition affects the proper function of a system or element involved with the safety of life or health, said system or element shall revert to a state known to be safe to all personnel interfacing with the equipment.

d) The BHS contractor shall ensure that all furnished and installed equipment meets all applicable local, state and federal safety codes and requirements.

1.14.3 Personnel Safety

a) The BHS contractor shall provide convenient means for emergency system shutdown, as well as for reset/restart.

b) Provide adequate means for ensuring the safety of all personnel who have access to the system in the system design. The BHS contractor shall provide sufficient safety signage throughout the system. Provide ample work space in all limited BHS access areas

c) The operation of the system shall be convenient and safe to use, and control functions to be performed shall be simple, to minimize possible errors.

d) Provide lockable devices such as motor safety disconnect switches and lockouts to prevent the accidental activation of those portions of the system shut down for maintenance. These devices shall be located in all associated areas and labeled properly for the associated equipment.

e) Provide equipment and component guards on all drives for conveyors and associated devices. House all moving parts in personnel areas with guards, (painted OSHA #1016 or #1026 “Safety Yellow”) for Bearings and Return Rollers at a minimum.

f) Provide audible and visual warning signals along all areas of the system to make apparent any potential hazards to the public, operating and/or maintenance personnel resulting from moving or commencing to start equipment.

g) Provide protection from falling objects in work areas or aisles located beneath overhead portions of the system with gap pans, netting etc.

h) Locate conduits and all other electrical components where they shall not be subject to damage by maintenance or operational personnel.

1.14.4 Life Safety

a) The BHS contractor shall be responsible for the coordination of all the “Egress Routes”, with the Owner (or OAR). The BHS contractor shall supply all the necessary equipment to satisfy all the life safety requirements, including crossovers, ladders, stairs, lift gates and catwalks.

b) All the safety measures shall protect the entire staff of the BHS from injuries. This also includes tug & dolly ram protection, work platforms and all the other areas of the BHS where only the maintenance staff has access.

c) All the BHS safety measures shall be in accordance with the federal, state, and local OSHA requirements and/or any other applicable safety regulations. The BHS contractor is also fully responsible to incorporate into their design, any additional associated safety features and/or requirements.

1.14.5 Safety Signs and Graphics

a) The BHS contractor shall provide and install all the required safety signs and graphics for the associated BHS equipment. All the BHS “Warning” and “Caution” signs shall be visible to personnel accessing and/or working within the baggage conveyor areas.

b) The safety signs and graphics shall be pre-printed phenolic or metal signs, permanently mounted to the applicable BHS equipment, or on the walls or structures for which they are intended.

c) The BHS contractor shall submit samples of the safety signs and graphics to be used for the Project. The Owner reserves the right to request additional signage and graphics for any associated personnel protection.

d) At a minimum, the BHS safety and warning signs shall include but not limited to such items as:

1. Conveyors Start Automatically
2. Equipment May Start Without Warning
3. Electrical Equipment – Authorized Personnel Only
4. Danger – High Voltage
5. Turn Off Power Before Opening
6. Turn Off Power Before Working On Conveyor
7. Do Not Operate With Guards or Doors Open
8. Do Not Walk Under Conveyor
9. Do Not Walk On Conveyor
10. Keep Off Conveyor
11. Caution - Low Overhead Clearance
12. Caution - Overhead Conveyor
13. Pinch Points

e) General caution signs shall be located at the entrances to the BHS matrices or conveyor areas and shall include but not limited to such items as:

1. Only Authorized Personnel should operate conveyors
2. Do not start conveyor without audible or visual warning, “All Clear”
3. Know the locations and functions of E-Stops (Emergency Stops)
4. Do not remove jammed baggage with conveyor running or power on
5. Turn off power before working on conveyor
6. Do not walk / ride / sit or climb on conveyor without turning off all associated power supplies
7. Do not operate conveyors with guards or protective equipment removed
8. Keep areas around conveyors clear of obstructions and debris
9. Report all unsafe conditions and practices to your supervisor

1.14.6 BHS Contractor Requirements

a) Conditions

1. The BHS construction, alteration, and/or repair, (including painting and decorating), shall not require any laborer or mechanic (employed in the performance of the contract) to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to their health or safety.

b) Accident Prevention

1. It shall be the BHS contractor’s responsibility to initiate and maintain accident prevention programs. The prevention programs shall provide for frequent and regular inspections of the job sites, materials, and equipment. If a particular standard is specifically applicable, it shall prevail over any different general standard practice.
2. Safe off all openings in floors, ceilings and catwalks to prevent objects from falling.
3. The use of any machine, tool, material, or equipment which is not in compliance with any applicable requirement is prohibited. Any defective machine, tool, or equipment shall be identified as unsafe by tagging or locking the controls to render them inoperable.
4. The BHS contractor shall permit only authorized employees (with adequate training or experience) to operate equipment and machinery. The BHS contractor shall instruct each employee in the recognition and avoidance of unsafe conditions, and the regulations applicable to their work environment, to control or eliminate any hazards, or other exposure to illness or injury.
5. The BHS contractor’s employees handling or using poisons, or any other harmful substances shall be instructed as to the safe handling and use, and be made aware of the potential hazards, personal hygiene, and personal protective measures required.

2 Part 2 - BHS PRODUCTS

2.1 BHS ACCEPTABLE MANUFACTURERS

A minimum of five (5) years of demonstrable experience with similar systems (size and complexity) as a turnkey BHS contractor is required. The BHS contractor shall have previous experience with TSA approved EDS and ETD units. The BHS equipment and components shall be in compliance with the Contract Drawings, documentation and this specification, and pre-qualified separately by the Owner (or OAR).

2.1.1 BHS Prime Contractors

The following firms are qualified to bid prime turnkey implementation and perform as Contractors and Integrators for the Baggage Handling System work on this Project:

a) Jervis B. Webb Company, Farmington Hills, Michigan

b) Siemens Parcel Post, DFW Airport, Texas

c) Vanderlande Industries, Inc., Marietta, Georgia

d) Five Star Airport Alliance (Horsley Co), SLC, UT

e) Automatic Systems, Inc., Kansas City, MO

f) Diversified Conveyors International, LLC (DCI), Memphis, TN

g) Owner (or his Representative) Approved Equal

2.1.2 BHS Controls

The following firms are qualified to perform as BHS Controls subcontractors for this Project:

a) Alliant Technologies, Louisville, KY

b) CLX Engineering Sanford, FL

c) Brock Solutions US, Inc., Irving TX

d) Vanderlande Industries, Inc., Marietta, Georgia

e) Jervis B. Webb Company, Farmington Hills, Michigan

f) Intellimodus, Inc., Louisville, KY

g) Kasa Controls & Automation, Salina, KS

h) Owner (or OAR) Approved Equal (prior to bid)

2.2 BHS ACCEPTABLE EQUIPMENT - MECHANICAL

NOTE: Consideration to the existing equipment shall be made when making the final vendor selection, to minimize the number of spare parts that must be stored on site.

2.2.1 Motors

a) Baldor (Reliance)

b) SEW Eurodrive

c) U.S. Motors

d) Nord Drivesystems

e) Owner (or OAR) Approved Equal

2.2.2 Brakes

a) Baldor (Reliance)

b) Stearns

c) Warner

d) EMTorq

e) Owner (or OAR) Approved Equal

2.2.3 Bearings

a) Dodge (Baldor Electric Company) ABHS series

b) Sealmaster/Morse Industrial Corp.

c) Owner (or OAR) Approved Equal

2.2.4 Belting

a) Ammeraal Beltech

b) Habasit Belting, LLC

c) Siegling America, Inc.

d) Owner (or OAR) Approved Equal

2.2.5 Reducers

a) Dodge "TXT" ABHS

b) Dodge Quantis

c) SEW Eurodrive

d) Nord Drivesystems

e) Owner (or OAR) Approved Equal

2.2.6 Roller Chain

a) Diamond Chain Company

b) Morse Industrial

c) Owner (or OAR) Approved Equal

2.2.7 Belt Conveyors

a) Jervis B. Webb Company, Farmington Hills, Michigan

a) Siemens Parcel Post, DWF Airport, Texas
b) Vanderlande Industries, Inc., Marietta, Georgia
c) Five Star Airport Alliance (Horsley Co), SLC, UT
d) Automatic Systems, Inc., Kansas City, MO
e) Owner (or OAR) Approved Equal

2.2.8 Fire/Security Doors

a) Cookson Company
b) Vigneaux Corporation
c) Raynor
d) Cornell Iron Works
e) Airport Equipment Specialists Inc.
f) Owner (or OAR) Approved Equal

2.2.9 Draft Curtains

a) TRAX Industrial Products
b) Necor
c) Owner (or OAR) Approved Equal

2.2.10 Power Turns

a) Portec, Flo-Master Division
b) Flow-turn
c) Owner (or OAR) Approved Equal

2.2.11 45 Degree Take-Away / Merge Conveyors

a) Jervis B. Webb, Inc.
b) Siemens Airport Logistics
c) Vanderlande Industries, Inc.
d) Five Star Airport Alliance (G&T Conveyor and Horsley Co)
e) Transnorm Systems, Inc.
f) Owner (or OAR) Approved Equal

2.2.12 Queue Conveyors (positive tracked)

a) Jervis B. Webb Company, Farmington Hills, Michigan
b) Siemens Parcel Post, DWF Airport, Texas
c) Vanderlande Industries, Inc., Marietta, Georgia

d) Five Star Airport Alliance (Horsley Co), SLC, UT

e) Automatic Systems, Inc., Kansas City, MO

f) Owner (or OAR) Approved Equal

2.2.13 Roller and Ball Conveyor

a) Interroll

b) Hytrol

c) Ashland Conveyor

d) Owner (or OAR) Approved Equal

2.2.14 Slope Plate Conveyor

a) Jervis B. Webb Company, Farmington Hills, Michigan

b) Siemens Parcel Post, DWF Airport, Texas

c) Vanderlande Industries, Inc., Marietta, Georgia

d) Five Star Airport Alliance (Horsley Co), SLC, UT

e) Automatic Systems, Inc., Kansas City, MO

f) Owner (or OAR) Approved Equal

2.3 BHS ACCEPTABLE EQUIPMENT - ELECTRICAL

2.3.1 MCP Cabinets

a) Hoffman Engineering Co.

b) Control Engineering Company

c) EMF Company, Inc.

d) Eaton

e) Saginaw Control and Engineering

f) Owner (or OAR) Approved Equal

2.3.2 Automatic Tag Readers (ATR)

a) SICK Auto Ident, Inc.

b) Cognex, Corp.

c) DataLogic Inc.

d) Owner (or OAR) Approved Equal

2.3.3 PLC/IO Platform

a) Allen-Bradley

b) Owner (or OAR) Approved Equal

2.3.4 Motor Starters

a) Allen-Bradley

b) Schneider Electric

c) Owner (or OAR) Approved Equal

2.3.5 Control Relays

a) Allen-Bradley

b) Schneider Electric

c) Eaton/Cutler Hammer

d) Owner (or OAR) Approved Equal

2.3.6 Circuit Breakers

a) Allen-Bradley

b) Eaton/Cutler Hammer Schneider Electric

c) Owner (or OAR) Approved Equal

2.3.7 Fuses and Fuse blocks

a) Littelfuse

b) Bussman

c) Owner (or OAR) Approved Equal

2.3.8 Hour Meters

a) Hobbs Corporation

b) ENM Company

c) Owner (or OAR) Approved Equal

2.3.9 Programmable Logic Controllers

a) Allen-Bradley

b) Owner (or OAR) Approved Equal

2.3.10 Operator Interface Terminals

a) Allen-Bradley

b) Owner (or OAR) Approved Equal

2.3.11 Photo Electric Cells (Photoeyes)

a) Allen-Bradley

b) Photocraft

c) Schneider Electric

d) Owner (or OAR) Approved Equal

2.3.12 Shaft Encoders

a) Allen Bradley

b) Photocraft

c) Schneider Electric

d) Owner (or OAR) Approved Equal

2.3.13 Signaling/Alarms

a) Allen Bradley

b) Edwards

c) Federal

d) Mallory (Sonalert)

e) Owner (or OAR) Approved Equal

2.3.14 Variable Frequency Drives

a) Allen Bradley

b) SEW Eurodrive

c) Schneider Electric

d) Nord Drivesystems

e) Owner (or OAR) Approved Equal

2.3.15 Control Transformers

a) Acme

b) Allen Bradley

c) General Electric

d) Owner (or OAR) Approved Equal

2.3.16 Control Stations

a) Hoffman

b) Allen Bradley Type 800T

c) Saginaw Control and Engineering

d) Owner (or OAR) Approved Equal

2.3.17 Switches and Pushbuttons (30.5MM)

a) Allen Bradley Type 800T (LED)

b) Owner (or OAR) Approved Equal

2.3.18 Motor Safety Disconnects

a) Allen Bradley

b) General Electric

c) Square-D

d) Cutler-Hammer

e) Westinghouse

f) Owner (or OAR) Approved Equal

2.3.19 Liquid Tight / Flexible Conduit

a) Anaconda

b) Sealtite

c) EF liquid tight

d) Owner (or OAR) Approved Equal

2.4 BAG LOADING INSTRUCTIONS

2.4.1 Odd Size / Oversize

The following is a list of typical items that shall be handled via the oversize process and not inserted into the baggage handling system:

1. Hand Trucks
2. Dollies
3. Tool boxes
4. Heavy items
5. Items that may separate
6. Hockey sticks
7. Tennis rackets
8. Boogie boards
9. Lawn chairs
10. Low profile objects
11. Umbrellas
12. Strollers
13. Coolers

2.4.2 Special Note

a) Travelers may only transport “UNLOADED” firearms in a locked, hard-sided container in or as checked baggage.

b) All firearms, ammunition and firearm parts, including firearm frames and receivers, are prohibited in carry-on baggage.

c) Realistic replicas of firearms are also prohibited in carry-on bags and must be packed in checked baggage.

d) Rifle scopes are permitted in carry-on and checked bags.

e) All firearms must be declared to the Airline during the ticket counter check-in process, (within the Terminal), and then transported to the designated CBRA area.

2.4.3 Special Instructions for Screening Inputs

The following instructions must be used when introducing baggage into the inline screening system:

a) Tubs - Tubs shall be used for any small and/or lightweight bags. Tubs shall be used for any “round” bags that shall fit in a tub. The tub size shall be coordinated with the Owner. Extremely overstuffed bags shall roll on the system and shall be placed in a tub.

b) Tags - IATA Barcode Tags shall be visible when placing bags in a tub.

c) Wheels - Bags with wheels shall be inserted wheels up.

d) Car Seats - Car Seats shall be placed face down with the top of the car seat pointing in the direction the conveyor is travelling.

e) Golf bags - Golf bags that measure less than 54” in length are acceptable in the inline screening system. Bag tags shall be placed on the center handle.

f) Straps - Straps can get caught in the baggage system and shall be removed or tucked inside the bags prior to loading on the system.

g) Old Tags - Be sure to remove old IATA and/or Pier Tags from other stations.

2.5 BHS CONVEYORS AND EQUIPMENT

2.5.1 Equipment

a) The BHS conveyors and equipment shall be numbered in consecutive order, in a manner that is consistent with the system / subsystem identification, (detailed on the contract documents). Numbers shall increase as travelling downstream. Naming conventions shall follow PGDS.

b) The BHS contractor shall provide identical types of equipment to minimize the spare parts requirements, (wherever functional or practical).

c) The BHS contractor shall design, provide and install the belt conveyor systems, (including all the required supports for the associated conveyor sections). The BHS contractor shall select the associated equipment (including supports) to minimize noise and vibration.

d) The BHS contractor shall securely fasten each floor or overhead support to the ceiling overhead beams, or to the floor by methods approved by the Owner (or OAR).

2.5.2 Clearances and Configuration

a) All BHS conveyors shall be designed and installed to have a minimum of 36 inch baggage clearance, (above the conveying surface). The BHS contractor shall identify any areas where this clearance cannot be provided, (during the preliminary design stage).

b) Conveyor Clearances:

1. A minimum of 12” from motors, drive units and bearings to fixed obstructions such as walls, beams and columns.
2. A minimum of 24” clearance between conveyor guards for adjacent conveyors.
3. BHS contractor shall maintain the manufacturer’s recommended clearance for access and maintenance for other equipment (as outlined in their respective integration guidelines).
4. All applicable BHS equipment, conveyors, and associated components shall have a minimum underside clearance of 7'-6" from the bottom of the support structure to the floor, (wherever there may be personnel, tug or other traffic below).

c) For BHS conveyors transporting normal sized baggage, the maximum angles on inclines and declines shall not exceed 12 degrees in tracked areas and 21 degrees (not to exceed existing) in untracked areas, from the horizontal, (unless indicated otherwise on the Contract Drawings). The BHS contractor shall promptly notify the Owner (or OAR) where the slope shall be exceeded and/or the minimum clearances cannot be provided.

d) The BHS contractor shall conduct a field survey of all the conveyor paths and right-of-ways (prior to the submission of the design, installation and/or assembly drawings).

2.5.3 Baggage Characteristics

2.5.3.1 Types of Baggage. The type of baggage which the BHS shall convey can be classified as follows:

a) Normal baggage: Those items which can be processed by the conveyor system without special handling. The following defines the physical dimensions of normal baggage:

	Length	Width	Height	Weight
Max.	54”	30”	36”	120 lbs.
Min.	12”	12”	4”	5 lbs.

b) Odd-sized: In addition to dimensional and weight restrictions, items being checked shall be in suitable condition to travel through the system safely and securely without causing jams or interruption to the operation of the system's hardware.

1. Baggage and objects which would be unstable on the conveyor shall be placed in low profile tubs before induction into the system.
2. Car seats, garment bags or similar soft sided bags, as well as items with loose straps, strings, ropes or hooks also fall into this category. All such bags shall be laid down in tubs.

c) Over-sized: Items are considered to be "Over-sized" if they exceed any of the maximum dimensions listed above, and also is considered to include items such as animal cages, skis, fishing poles, map cases, etc. (which cannot be handled by the BHS). Oversized items shall be manually handled by airport and screening personnel.

d) Out of Gauge: Items which cannot be processed by the corresponding EDS units is considered to be Out of Gauge.

L3 6700 ES (as stated in integration guide):

	Length	Width	Height
Max.	100"(1)	31.0"	24"(2)
Min.	12"	12"	4"

(1) Maximum length limited by power turn radius within the system normally 54" is used.

(2) Due to the concave opening of the machine, the maximum height will be reduced as bag width increases.

2.5.3.2 Tubs

a) Bag tubs should be used for any item that is irregular in shape or does not have at least one flat surface and will have a tendency to roll around or move while being transported on a conveyor. A final definition of the tubbing policy shall be provided by the contractor prior to testing.

b) The tubs used for testing shall be provided by the Owner (or OAR). Coordinate testing requirements with the Owner (or OAR).

c) The tubs shall be large enough to accommodate a car seat.

d) The initial purchase of tubs shall be coordinated with the Owner (or OAR). For estimation purposes, approximately 200 tubs shall be provided initially by the contractor.

2.5.4 Design Loads and Rates

a) All BHS transport belt conveyors shall be designed for a live load of 40 lbs/ft (linear ft) at a belt speed of 90 fpm (adjusted to reflect speed variations and throughput). For calculating the required load of transport conveyors, use formula: 40 lbs/ft x (90 FPM / actual conveyor speed) x (throughput rate / 25 bags/min) = required lbs/ft. The minimum load on any baggage conveyor (after speed and throughput are considered) shall be 25 lbs/ft.

b) Conveyors that shall have a fixed live load requirement are as follows:

1. BHS belt load, unload, and accumulating conveyors operating up to 120 ft/min shall be designed to convey a live load of 60 lbs/ft.
2. Slope plate conveyors shall be designed to convey a live load of 125 lbs/ ft.
3. Flat plate conveyors shall be designed to convey a live load of 85 lbs/ ft.

c) A subset of typical design rates, speeds and loads are shown in the table below:

Subsystem	**Throughput bags/min**	**Speed ft/min**	**Load lbs/ft**
Ticket Counter Load Belt	25 bpm	90 fpm	60 lbs/ft
Main Line Transport Belt Conveyor	60 bpm	240 fpm (1)	36 lbs/ft
Sortation Belt Conveyor	60 bpm	270 fpm (1)	32 lbs/ft
Slope Plate Conveyor	25 bpm	90 fpm	90 lbs/ft
Flat Plate Conveyor	25 bpm	90 fpm	85 lbs/ft
Inbound Transport Belt Conveyor	30 bpm	120 fpm (1)	36 lbs/ft
Manual Encoding Belt Conveyor	15 bpm	90 fpm	40 lbs/ft
Pre/Post EDS Queueing	As required by EDS manufacturer		

(1) Shown for example, final speeds for transport conveyors shall be determined as part of the design process based on bag flow, throughput, equipment requirements etc.

d) The BHS Static Load Rating for any conveyor shall be 250 pounds of concentrated load.

e) The “Coefficient of Friction” between belt and slider bed shall be determined by the belt manufacturer’s recommendation and used in calculating the horsepower. All BHS conveyor drives shall be sized so that starts can be made under full load conditions.

f) Live load shall also be reflective of the bags per minute (BPM) rate. For example, if two lines of equal rate are merged together the new load shall reflect twice the single line load.

2.5.5 Dependability

a) The BHS conveyors and associated equipment shall operate reliably and be reasonably free of breakdowns. The design of the components within the BHS

shall provide for ease of maintenance, replacement accessibility, and service requirements.

b) All BHS mechanical components shall operate satisfactorily within a temperature range of 20 degrees F to 140 degrees F, with a relative humidity of 0 to 100 percent (non-condensing)

c) The BHS shall be capable of continuous operation, (20 hours a day, 7 days a week, and 365 days a year), with provisions for routine preventative maintenance, as specified in the “O&M” manual.

2.5.6 Maintainability

a) The BHS equipment components that require inspection and servicing shall be readily accessible.

1. Either suitable access doors or removable enclosures shall be provided and installed for these purposes (as shown on the drawings).
2. Either maintenance access holes in conveyor frames or guards are acceptable, (but shall be held to a minimum number and size). Access holes shall not create protrusions or discontinuities that are damaging to the BHS equipment and/or to the baggage being conveyed.

b) All the BHS assemblies and components shall be easily disconnected and removed from the associated equipment without the necessity for extensive disassembly.

1. All BHS assemblies and components shall be designed for removal and replacement by two (2) people in a period not to exceed two (2) hours.
2. The Owner (or OAR) reserves the right to request a demonstration of the replacement of an item, during the O&M training session.

2.5.7 Preventive Maintenance

a) The BHS may be shut down for routine or Preventive Maintenance (PM) during non-operational hours. Portions of the baggage screening matrix may be shut down during low volume periods.

b) The system shall be so designed that no scheduled preventive maintenance task requires more than two (2) hours of full system shutdown, or four (4) hours of reduced operations, or any combination of both in excess of four (4) hours.

1. All components and subsystems shall be designed for replacement within this period.
2. All components and assemblies shall be easily disconnected and removed from the equipment without requiring extensive disassembly.

2.5.8 Speeds

a) The BHS conveyor speeds that are indicated on the Contract Drawings are for reference only. The actual BHS conveyor speeds shall be determined by the

BHS contractor, in accordance with good design practice and system throughput requirements. BHS conveyor speed increases or decreases shall not exceed 30 FPM. Coordinate speeds at all interface locations to existing conveyors and conveyors associated with other projects if applicable.

b) The BHS shall be capable of transporting all associated checked baggage from the furthest input point to the furthest output point within a predetermined time period. The BHS shall transport the baggage smoothly and effectively without causing the bags to slip, slide, snag, tumble, or roll.

c) Typical speeds, unless otherwise defined shall be:

1. Load/Unload – 120 ft/min
2. Slope Plate/Makeup – 90 ft/min
3. Transport – Varies by design (below 240 ft/min preferred)
4. Merges – equal to, or greater than the take-away

2.5.9 Vibration

a) The BHS contractor shall provide shaft mounted components (pulleys, sprockets, etc.) and other components subjected to vibration with some means of preventing loosening of the component such as snap rings, cotter pins, or other methods approved by the Owner (or OAR).

b) Mount all conveyor components that are supported from structural elements adjoining public and/or office space on vibration isolation pads (or hangers) to eliminate perceivable vibration from being transmitted to the building.

c) BHS conveyors and components that are attached to header steel, (surface mounted to building elements and/or mezzanines) shall not transmit any vibration. Such items shall be fitted with vibration isolators (to eliminate vibration), at no cost to the Owner.

d) Vibration isolators may be specified elsewhere in this document (above those minimally required), reducing sound levels and perceivable vibration. Exception: Spring type vibration isolation may not be used to support Merges.

e) The conveyor systems that are designed and installed by the BHS contractor shall not produce or induce objectionable vibrations into the building structure. The vibration levels that are induced by the BHS and/or its components shall not be injurious to the system, or the building structure, or be harmful or annoying to the passengers and/or employees. The BHS contractor shall provide and install any necessary vibration isolation devices (or techniques) required to meet this requirement.

2.5.10 Ancillary Items

a) It shall be the BHS contractor’s responsibility to coordinate the design of the baggage conveyors and its ancillaries with all attachments and hardware, including but not limited to:

1. Impact protection
2. Safety guards and signage
3. Draft curtains
4. Associated devices and components

b) BHS gap pans shall be provided and installed on all the conveyor-to-conveyor transfer points. Gap pans shall be not less than 12 gauge sheet metal with a minimum of one (1) inch high sides on the edges. The gap pans shall be easily removed and installed and shall also have smooth edges.

c) Designated pathways shall be assigned for larger maintenance equipment to be transported. Methods to provide this pathway may be provided by the following means:

1. The use of a crane to move equipment is allowable with Owner (or OAR) approval.

2.5.11 General Drive Requirements

a) The BHS conveyor drives shall be located near the head end of the conveyor (where clearance permits). Exception: Reversing conveyors shall have the drive located near the middle of the conveyor.

b) All BHS drive units utilizing V-belts and sheaves shall be equipped with suitable guards of “Clamshell” design with quick-release fasteners and shall be fabricated from 16-gauge steel (at a minimum).

c) All drive guards shall comply with the applicable “OSHA” standards and shall be provided with an expanded or slotted metal viewing port, to allow for belt inspection (without removing the guard). All drive guards shall be painted OSHA #1016 or #1026 “Safety Yellow”.

d) All BHS conveyor drive motors and/or reducers shall be provided with adequately sized drip pans. The drip pans shall be easily removed and installed and shall also have smooth edges.

e) The BHS conveyor drive sprockets and/or V-belt sheaves shall be provided with a taper-lock type hub construction, (with keyways). The associated sprockets shall be steel, with a minimum of thirteen (13) “Type B” form teeth.

f) The BHS conveyor drive sheaves shall be “two-groove”, A-section pulleys, with taper-lock type hubs (at a minimum). All the pulley assemblies that are four (4) inches or greater in diameter shall use taper-lock hubs and bushings.

g) The roller chain provided for BHS equipment shall be compatible with the torque and horsepower requirements, (but not less than RC-60 in size). The roller chain ends shall be connected with a removable “master link”.

h) All of the BHS lubrication points and “zerk style” grease fittings shall be easily accessible from the maintenance platform or designated maintenance access location.

2.5.12 Motors

a) The BHS conveyors shall be driven by copper wound AC induction motors, (minimum NEMA-B rated), except for crescent plate and slope plate devices, (which shall have a minimum NEMA-C motors).

b) The BHS motors shall be sized for the maximum load and belt speed requirements under continuous operation with a minimum of two (2) HP, and a maximum of seven and a half (7.5) HP. Any BHS motor sizes that vary from the sizes stated on the installation drawings shall require the approval of the Owner (or OAR), prior to installation.

c) All BHS motors shall be Totally Enclosed Fan Cooled (TEFC) and shall be provided with the appropriate overload protection, (in the associated motor control panel).

d) The motors shall be constant speed (1800 RPM), continuous service, and ball-bearing type, with a minimum of class “B” insulation. The service factor on BHS motors shall be a minimum of 1.15.

e) Where applicable, the motors shall be capable of withstanding shock caused by frequent starting and stopping (under full load conditions). The BHS motor sizing shall permit a minimum of 20% speed increase (on any baggage conveyor), without changing to larger motors.

f) If BHS conveyor overrun is critical to the system control operation, then the motors shall be equipped with automatically applied brakes, to prevent overrun, (after the motors are de-energized). The BHS motors that are used on inclines or declines (where rollback would be critical) shall be equipped with brake motors. The braking mechanism (solenoid) shall engage the brake upon the removal of power to the motor. The stopping torque shall be equal to (or greater than) the starting torque of the motor.

g) The BHS motors that are used in tracked areas and on indexing belts (including merges or other belts with frequent Start/Stop operations) shall be controlled by a Variable Frequency Device (VFD). Indexing conveyor drives shall be capable of a minimum of 30 continuous Start/Stop cycles per minute (when fully loaded).

h) BHS removable conveyors shall have electrical connections equipped with heavy duty “quick disconnect” couplings. All BHS conveyors that are adjacent to EDS units (that are required for EDS removal and/or installation) shall be equipped with “quick disconnect” couplings.

2.5.13 Reducers

a) The BHS reducers shall be shaft-mounted where adequate clearance and maintenance access exists. In applications where physical space is limited, powered pulleys may be substituted.

b) All BHS reducers shall be sized for Class II application and shall have a service factor based on a L10 life of 70,000 hours.

c) All BHS chain drives, belts, and rotating shafts shall be equipped with protective guards. All the associated protective guards shall be painted OSHA #1016 or #1026 “Safety Yellow”.

2.5.14 Pulley Assemblies

2.5.14.1 Drives

a) The BHS power pulleys used for end-type drives or power take-offs shall be lagged with (a minimum of) 3/8 inch thick “vulcanized lagging” of 55-70 durometer and shall be 6 3/4 inch in diameter crown faced (at a minimum), and equipped with taper-lock type hubs, and 1-7/16 inch (minimum) diameter.

1. The pulleys shall be designed to and in compliance with AISI 1018 steel and be in accordance with CEMA standard No. 402-1992 (as revised).
2. Shafts shall be mounted in precision-and-ground flange-type ball bearing units.

b) The pulleys and shafts sizes are determined by the maximum belt pull as follows:

1. Light-duty: (300 pounds maximum belt pull) shall consist of a 6-3/4 inch (minimum) diameter drive pulley, with a 1-7/16 inch (minimum) diameter shaft. Where used, the roller chain shall be RC-60.
2. Normal-duty: (500 pounds maximum belt pull) shall consist of an 8-3/4 inch (minimum) diameter drive pulley, with 1-11/16 inch (minimum) diameter shaft. Where used, the roller chain shall be RC-60 or larger.
3. Intermediate-Duty: (1,000 pounds maximum belt pull) shall consist of 10-3/4inch (minimum) diameter drive pulley, with a 1-15/16 inch (minimum) diameter shaft. Where used, the roller chain shall be RC-80 or larger.
4. Heavy-duty: (1,500 pounds maximum belt pull) consists of 12-3/4 inch (minimum) diameter drive pulley, with a 2-3/16 inch (minimum) diameter shaft. Where used, the roller chain shall be RC-80 or larger.

c) BHS end-type drive units may be used for conveyors 25 feet or less in length. Associated crown-faced pulleys shall be tapered at (a minimum of) 1/8 inch per foot, from the center.

d) BHS drive pulleys shall be easily removable, without the disassembly of the drive frame unit, (preferably through the end plate).

e) All the associated power pulleys and shaft assemblies shall have a concentricity of 0.02 inch TIR (minimum).

f) The belt arrangement at the conveyor drive unit shall be routed so that the “tight side” of the belt passes over and around the drive roller, prior to the belt wrapping around the take-up pulley. Belt wrap around the conveyor drive roller shall be greater than 210 degrees.

2.5.14.2 Take-ups

a) All the BHS take-up pulleys shall be (a minimum of) four (4) inches in diameter, steel, crown-faced, and equipped with taper-lock type hubs, and shall be 1-7/16 inch (minimum) diameter.

1. These take-up pulleys are designed to (and in compliance with) AISI 1018 steel, and in accordance with CEMA standard No. 402-1992 (as revised).
2. Shafts are mounted in precision-and-ground flange-type (with grease fittings) outboard ball bearing units.

b) BHS pulleys shall be mounted on threaded take-up devices with steel guides. The BHS conveyors shall be provided with take-ups for field adjustments of at least four (4) inches, or 2 % of the conveyor bed length, (whichever is greater). Take-ups that are provided shall be an integral part of the drive frames on all the intermediate-drive conveyors.

c) The associated take-up pulleys and shaft assemblies shall have a concentricity of 0.05 inch TIR/inch of shaft length (measured from the pulley hub). The pulleys shall be dynamically balanced, and aligned for straightness, and have a (maximum) Total Indicated Runout (TIR) of 0.02 inches.

d) All the BHS conveyor sections that are in excess of 50 feet in length (subject to extreme temperature and humidity changes) shall be equipped with automatic take-up devices.

e) The BHS contractor shall adjust the position of all the take-up pulley devices after the system testing (prior to Substantial Completion) of the system, so that no more than 25% of the take-up device adjustment has been used.

2.5.14.3 Head and Tail Pulleys

a) The non-powered BHS head and tail pulleys shall be steel, crown-faced, equipped with taper-lock type hubs, and shall be 1-7/16 inch (minimum) diameter.

1. These pulleys are designed to (and in compliance with) AISI 1018 steel, and in accordance with CEMA standard No. 402-1992 (as revised),
2. Shafts are mounted in precision-and-ground flange-type ball bearing units.

b) The BHS head and tail drive pulley shall be six (6) inch in diameter, with a (minimum) #10 gauge wall.

1. These pulleys shall be of a single piece steel construction and have steel discs attached to the rim, by continuous welding.
2. The associated slider bed shall be arranged to keep the gap between the end section and the end pulley to a minimum.

c) The BHS head and tail pulleys that are used for belt tracking shall be equipped with jacking bolts (to facilitate adjustment).

1. The BHS head and tail pulleys and the shaft assemblies shall have a concentricity of 0.02 inch Total Indicated Run-out (TIR) minimum.
2. The shaft run out of each assembly shall not exceed 0.02 inch TIR/inch of shaft length (measured from the pulley hub).
3. The jacking bolts used to adjust the tracking shall have a minimum of 50% adjustment remaining after the belt has been tracked.

d) All other BHS conveyor head and tail pulleys (for units not covered above) shall be the same as described under Power Pulleys. The BHS conveyors may be driven by a power pulley in the head end pulley location if the length is less than 25 feet.

2.5.15 Bearings

a) The BHS bearings shall be pre-lubricated, sealed for life, self-aligning and anti-friction.

1. The associated bearings shall have a minimum L-10 life of 70,000 hours (based on the service and loading of conveyors, and on the manufacturer's published data).
2. All of the exposed bearings in the BHS work areas, EDS areas, and ETD areas shall have bearing covers (and/or meet minimum OSHA enclosure requirements) for personnel safety. The bearing covers shall be painted OSHA #1016 or #1026 "Safety Yellow".
3. All the associated bearings shall be surface-mounted flange bearings that are attached to the outside of the conveyor bed, (unless otherwise specified).

2.5.16 Conveyor Bed Frames

a) The BHS conveyor bed frames shall be reinforced with a minimum of 1/8-inch thick steel, in the area of attachment of the motor/gear reducer assembly.

1. The BHS conveyor beds shall provide a low-friction sliding surface for the conveyor belts. All BHS conveyor joints shall be smooth, with no protruding rough or sharp edges on the fasteners, corners, joints or seams that could cause injury to personnel, damage to the baggage or bag tags, or could cause the system to jam.
2. All of the edges shall be formed, 90 degrees, (turned away from the conveyor) and exposed edges shall be smooth and without burrs. The

outside edge of all the floor mounted BHS conveyor sections shall have smooth, continuous surfaces (with no sharp edges).

b) The BHS conveyor bed lengths (noted on the drawings) are approximate. The BHS installer shall field-cut the associated conveyors to the exact lengths (where required). The total conveyor bed length shall be in components of 10 foot (maximum) bed sections that bolt together. The BHS conveyor bed sections shall not exceed a maximum of fifty (50') feet in length.

c) Conveyor "break-over" sections shall have a minimum of 5'-0" radius break-over; (10'-0" radius break-over shall be used wherever possible). For conveyor return belt idling, the vertical bends shall be equipped with a standard four (4) inch snub roller.

d) Smooth transitions on the standard break-over sections shall be utilized for the following:

1. Transitions from horizontal to downward slope
2. Transitions from upward slope to horizontal to downward slope
3. Transitions from upward slope to horizontal

e) The BHS conveyor identification numbers shall be neatly painted onto the corresponding conveyor sideguard, (adjacent to the motor). Each conveyor identification number shall be carefully and neatly painted white, (4" in height). The BHS conveyor I.D. shall be as shown on the approved shop drawings.

2.5.17 Side Guards

a) The BHS conveyor side guards shall be a minimum of #11 gauge HRS, (integral to the slider bed), with a formed 90 degree turned away from the conveyor, and with a formed 90 degree edge turned down (to eliminate sharp edges). All side guard edges that are exposed to personnel as part of baggage jam clearance shall be provided with self-adhesive vinyl edge guards.

b) All the BHS side guards shall provide a continuous, uninterrupted surface. All the joints between the conveyor bed sections shall be smooth (to insure a non-snagging surface).

c) The side guards that are mounted adjacent to power turns shall be in alignment with the effective belt width of the turn.

d) The conveyor side guards shall be reinforced with 1-1/4 inch x 1-1/4 inch x 3/16 inch vertical angle stiffeners, at not more than three (3) feet four (4) inch centers (on transport conveyors), and not more than two (2) feet six (6) inch centers (on load conveyors). The baggage conveyor side guard height shall be twelve (12) inches in industrial areas, and twenty-one (21) inches when located over public areas (unless noted on the drawings). BHS conveyor side guards of different heights shall have thirty (30) degree transition panels.

e) The BHS side guards that are used in exterior applications shall be galvanized, (with G-90 coating). Note: The coating may be substituted with an industrial grade “epoxy coating” (rust inhibitive) and painted to match the conveyor frame.

f) The BHS contractor shall take special care in manufacturing and installation to insure smooth, snag-free butt joints without the use of “epoxy fillers”. The BHS contractor shall apply “epoxy fillers” only on an exception basis, (i.e. where the joint cannot be otherwise aligned by using the acceptable methods).

g) If the BHS conveyor side guards are not an integral part of the frame and are attached separately, adhere to the following:

   1. The side guards shall be secured to the frame at (a maximum of) 1.5 inches on each side of the stiffeners, and at (a minimum of) one point midway between the stiffeners.
   2. The BHS contractor shall bolt all the conveyor side guards together at a maximum of six (6) inch vertical spacing.

h) The BHS contractor shall provide holes for the photoeyes and corresponding reflectors that are 1-1/2” diameter. The holes shall be “punched” (not burned), in the metal side guards in such a way that the dimple is pointed outward.

i) All holes in conveyor side guards that are not used shall be closed by welding a blank metal disk of the same gauge steel, ground flush on both sides of the guard and painted with matching paint.

j) Note: The baggage conveyor slider beds shall be unpainted, unless they are powder coated.

k) Unless noted otherwise on the drawings, typical side guard heights shall be as follows:

   1. Check-in load belt back guards shall be 21"
   2. Power turns (flat) shall be 21"
   3. Power turns (spiral) shall be 21"
   4. Transport conveyors shall be 12" in industrial areas
   5. Incline and decline conveyors shall be 21"
   6. Decline fed power turns (flat or spiral) shall be 21"
   7. All conveyors located over public areas shall have 21” side guards

2.5.18 Belting

a) BHS belting shall be no less wide than the distance “Between side Guards” (BG) minus three (-3) inches. The belting shall be flame retardant and in accordance with ISO 340, ASTM D-378, DIN 22103 and NFT- 47108 or equal.

   1. All conveyor belting shall have a minimum working tension of 100 pounds per inch.
   2. For incline and decline conveyors greater than seven (7) degrees, use bare by rough top or longitudinal rough top.

3. BHS belting in public areas shall be “smooth top” (PVC X FS) type.
4. Queue belting shall be Longitudinal Groove (LG) except queues with static deflectors, (which shall have “smooth top” belts).

b) All BHS belt lacing shall be Clipper type #2 or #1 (size based on belt manufacturer’s specification). Belt lacing shall be installed to prevent any damage to the belt, clipper or lacing.

2.5.19 Stainless Steel Trim

a) The BHS contractor shall provide stainless steel shrouding and stainless steel hardware, on all baggage conveyors that are located in public areas and/or conveyors that are visible to the public.

1. The BHS stainless steel used for this Project shall be Type 304, 12 gauge, with #4 brushed finished.
2. The BHS trim shall be fabricated from single sheets of stainless steel material without any open space between the joints.
3. All the joints are to be shop welded, ground smooth, and polished to match the untouched adjacent surfaces.
4. Countersunk stainless steel fasteners are required in all public areas.

2.5.20 Draft Curtains

a) The BHS draft curtains shall be provided at the corresponding wall and floor penetrations, that separate air conditioned and non-air-conditioned spaces.

1. The draft curtains shall be flexible strips with two staggered layers of four (4) inch wide x 1/8” inch thick, “black” vinyl strips.
2. In the public areas, the vinyl strips shall be attached to the stainless steel angle, Type 304, 12 gauge (#4 brush finish).

2.5.21 Fire/Security Doors

a) The BHS contractor is responsible for the design, interface with BHS system, acquirement, controls, power, installation and commissioning of the electrically operated, automatic closing fire/security doors at all fire rated openings as indicated on associated drawings. Any relocated doors shall be tested as if they are newly installed. Fire/security doors shall provide at a minimum the following:

1. Fire door U.L rating shall meet or exceed the fire rating of the partition wall to which it is mounted (1.5hr, 2hr, 3hr, etc.). The door shall be certified and correctly U.L. labeled by the manufacturer for the required rating. Verify the required fire rating with the proper governing authority for all fire doors in the scope of this contract.
2. Contractor shall be responsible for electrical wiring, conduit, sensors, disconnect switches, connection of the operator to the power supply, the installation and connection of control stations, and the interface connections to associated building alarm systems.

3. A 160-165° F fusible link shall be provided, which shall cause the fire/security door to automatically gravity close.
4. The fire/security doors shall be provided by the manufacturer with the electrical operator and a 480 VAC, 3 phase, 60 hertz motor. Door operator enclosures and electrical devices shall be NEMA rated for the environment that it is installed.
5. A control station and motor safety disconnect shall be provided for each powered fire/security door. These devices shall meet the same requirements as defined for the BHS system in this specification at a minimum and rated for environment in which they are installed as required by electrical codes.
6. Sensors connected to the PLC inputs, shall be externally mounted to detect the “full open” and “fully closed” position of the door. The associated conveyors shall stop running if the door is not in the “full open” position. These devices are in addition to internal sensors supplied with the door.
7. An internal sensor shall be installed at the bottom edge of the door for detecting a bag below the door edge. In addition, an external photo sensor connected to the PLC inputs shall be provided for detecting an obstruction below door.
8. Doors shall be equipped with a failsafe releasing device that allows doors to be gravity closed in the event of a signal from the fire alarm system, gravity drop or loss of power. Releasing mechanism will automatically reset upon resumption after a fire alarm state or resumption of power. No re-calibration or special actions shall be required following gravity fire closure.
9. The BHS contractor shall provide the interface wiring between the BHS MCP and the building central fire and security systems. Contractor shall be responsible for coordinating and provide all required signals between the BHS control system panels, the building fire system and the building security system, including conduit and wiring. Contractor is responsible for coordinating fire zoning (if applicable) and performing the necessary shut down responses to building fire system conditions.
10. The BHS contractor shall coordinate the installation and framing, (including the required steel trim), with the Owner (or OAR). For fire/security doors in the public view, the BHS contractor shall provide the Type 304, minimum 22 gauge, #4 brush finish stainless steel doors and trim as coordinated with the Owner (or OAR).
11. The fire/security doors provided shall have the ability to be manually operated (manual release and pull chain or crank). Manual chain or crank operators shall be located on the door operator side, safely separated from conveyor and door operating parts.
12. All operable parts, such as drive systems and trackways, shall be provided with removable safety guards.
13. Gapping between conveyors shall not exceed 3” where doors close between conveyors.

14. Fire/security shutters may be used in place of doors in tunnels or spaces where overhead height is restricted. Shutters must comply with the door specifications listed in this document with the exceptions of wind load ratings and continuous duty ratings. Shutters cannot be used in any opening exposed to outdoor winds or on 4 hour fire rated walls. Shutters are limited to 6-8 cycles per hour.

2.5.22 45º Take Away / Merge Conveyors

a) The BHS take away conveyors shall be designed as the typical slider bed construction. The drive take-up unit shall be located 90 degrees to the baggage flow. The BHS take away conveyors shall be designed and installed so that the belt tracking and/or the belt replacement can be accomplished with minimum effort and skill.

b) Drive system shall have a capability of operating at 30 cycles per minute and shall be equipped with VFD control.

c) The 45º take away conveyors shall be installed level or slightly lower than the upstream conveyor, so that it can transfer the bag in a smooth effective manner, with minimum displacement.

d) The 45º merge conveyors shall be installed 2” higher than the receiving conveyor, so that it can transfer the bag in a smooth effective manner, with minimum displacement.

e) The transition between the upstream conveyor and the receiving conveyor shall be adjusted by the BHS installer in a manner eliminating all snag points and gaps along the side guard, which may cause straps or other miscellaneous bag accessories to jam.

f) Merge / takeaway to collector (downstream) conveyor speed relationship must ensure that items are not skewed on the collector conveyor.

2.5.23 Power Turns

a) All power turns shall be type “C”. The (maximum) angle of any single BHS power turn shall be 180 degrees. The power turn frames shall be a minimum of 11-gauge, Hot Rolled Steel (HRS).

b) The End Roll Shaft shall be turned, ground and polished shafting (for reduced run-out). The shafting shall be keyed with industry standard keyways. BHS shafts shall be (minimum) 1-7/16” diameter. Steel “bar stock” material shall be provided between the inside radius side-guard of the curve and the adjacent straight conveyor or side-guard, (as required), to eliminate any gaps.

c) Mounting of any mechanical or electrical equipment on the outside radius side guard of power turns is not acceptable. This restricts maintenance access to the outer perimeter chain and/or guide bearings, of the power turn belt.

2.5.24 Queue Conveyors

a) The BHS queue conveyors shall be constructed of #11 gauge steel, with an integral bed and stiffeners. The queue belt shall be fabricated with a longitudinal “high-friction” top surface to allow minimal bag slippage, on conveyor stopping and starting.

b) The queue conveyors shall be “self-tracking” units, utilizing slider bed type construction. The motor shall be (a minimum of) two (2) HP @ 1800 Revolutions Per Minute (RPM). The associated drive shall be sized with (a minimum of) 1.15 service factor and shall be capable of 30 cycles (Start/Stop) per minute.

c) The associated pulleys shall be mounted in externally mounted ball bearings, and adjustable by means of jack screws (to allow for proper positioning and tensioning).

d) The queue bed shall be designed with guide slots, (on the outer edges), for belt tracking. The guide slots shall be centered at a maximum of one (1) 1/2 inch from the edge of the slider bed and include a lead in taper (to assist the belt attachment guides into the bed guides). The queue belting shall have guides attached to the bottom of the belt that shall align with, and travel through, the conveyor bed guide slots.

e) The width of the end rollers, drive rollers, snub rollers, etc. shall be sized (as required) so they are between the belt bushings, and do not interfere with the travel of the belt.

2.5.25 Slope Plate Device

2.5.25.1 General

a) Incline plate/slope pallet devices shall be constructed of articulating contoured pallets or flights forming a continuous, rotating, sloped surface. They shall be arranged to receive baggage from a feed conveyor(s) at a point on the inside rim as shown on the contract drawings. The unit shall be automatically fed via belt conveyor(s).

b) The BHS Contractor as part of the bid proposal can submit their standard incline plate/slope pallet device specifications for review. Final approval of the qualified manufacturer shall be at the discretion of the Owner (or OAR). The design, manufacture, and installation of the incline plate or slope pallet device shall conform to all sections of this specification as is appropriate.

c) The height of incline/slope pallet devices shall be as follows unless otherwise specified by the Owner (or OAR) or shown on the Contract Drawings: 16”+/-2” for Claim devices and 30”+/-2” for Makeup devices.

d) All incline/slope pallet devices shall be capable of supporting a minimum dynamic load of 125 pounds per linear foot.

e) The device operating speed for incline/slope pallet devices shall be 90 fpm.

f) Incline/slope pallet devices shall be capable of accepting baggage per each in-feed conveyor at a rate of twenty-five (25) bags per minute.

g) In conformance with OSHA standards all designs typical for baggage pick up and located within common areas include a physical barrier “bag stop” located on the exterior of the unit at the delivery belt entry point.

h) Provide a deflector guard for any fixed object, such as a column, that is 1’-0” or closer to the side of the slope plate outer periphery to prevent overhanging bags from being knocked off the unit.

2.5.25.2 Drives

a) Chain drives and friction drives are acceptable. Chain driven units shall consist of a heavy duty, double pitch roller chain driven by a motor through a gear reducer and drive sprocket. The roller chain shall always engage at least two modular flight assemblies.

b) For the new devices, a minimum of two drives, are required for each unit for redundancy purposes. The device shall be designed and configured such that if one of the drives should fail, the device shall continue to operate at 100% capacity including the ability to start-up under full load conditions with the remaining drive unit(s). An easy access and means for disconnecting a failed drive/reducer from the carriage chain/friction drive shall be provided to allow for system maintenance with a minimum of time and effort.

c) A one-way or sprag clutch are recommended to be installed between the reducer and the roller chain which will drive in only one direction and free wheel when the drive motor is failed or de-energized. The remaining drives shall not incur the additional load of a failed or de-energized drive.

d) Each drive shall be equipped with an appropriately sized electronic variable frequency drive controller. The drive design shall provide for potential of variations in “actual” motor speeds, synchronization, and torque load balancing. Motors are to be of the 480 VAC, 3-phase, 60 Hz Inverter duty copper-wound NEMA MG1, Part 31 Rated Design "B", Class "H" Insulation at 1.0 Standard Service Factor with Class "F" temperature limits. All motors shall be of the "high efficiency - low energy" type. The drive motor/VFD shall be sized to permit start-up under full load conditions.

e) The design of the drive motor circuitry and programming shall provide that the slope plate unit can remain operating when a drive motor safety disconnect switch turned to the off position. This condition shall be reported in the MDS alarms and status screen. Returning the disconnect switch to the on position in this case, shall not create an issue.

f) Provide one 120 VAC, single-phase, 60 HZ duplex outlet, as a maintenance outlet, along with a maintenance light and light switch, in the general vicinity of each drive assembly. The maintenance light on/off switch shall be installed under the claim device decking adjacent to each access hatch. A junction box in the general vicinity of each drive unit, with related wiring back to the respective circuit panel (s), will be provided by others. Assume the responsibility to coordinate the location of the junction box and to run the necessary conduit and wires between the junction box and the maintenance outlet, the light and light switch. Coordinate the installation of the maintenance lighting and outlet with the COTR.

g) The control system shall incorporate a startup delay to assure that the slope plate device is running at full speed prior the start-up of any feed conveyors.

h) Install a control station in close proximity to each drive unit with an Auto/Maintenance/Jog switch for use by maintenance personnel only. When the switch is in the maintenance or jog position, it shall prevent the respective feed conveyors to feed bags onto the unit. The Key switch for this control station shall also include control functionality that will permit the jogging of the unit for use by maintenance personnel only; the device shall move (jog) in the normal direction of baggage flow only when the key switch is held in the “Jog” position. The control station for this switch shall also include an E-stop pushbutton and a Reset/Restart pushbutton.

2.5.25.3 Cross-Overs

a) Makeup units (non-public side) shall have crossover(s) installed for maintenance access. A crossover shall consist of a handrail to assist in descending the inclines plates, a small platform and a ships ladder or stairway to descend into the inside of the unit. At minimum one (1) crossover for units less than 50 ft long, two (2) crossovers for units greater tan 50ft long.

b) Claim units (public side) shall not require maintenance crossovers.

2.5.25.4 Pallet/Flight Assemblies

a) Each flight assembly shall consist of a steel support assembly with upper support wheel, a flight (cover pan) and a segmented, molded rubber bumper at the lower end.

b) Each module shall be connected at its lower end to a continuous device linkage, which incorporates the lower support wheels. Upper and lower support wheels shall have polyurethane treads for quiet operation of the device. Flights shall be 14-gauge stainless steel with a rub strip (per manufacturer’s design) applied to the underside of each flight at the trailing edge to prevent scratching or scoring of pallets.

2.5.25.5 Frame and Track

a) The frame shall consist of standard modular assemblies bolted together to form a support structure and guide for the flight assemblies. The track shall be of rolled or formed structural steel. Structural supports for the tracks are to be spaced on a maximum of 4' centers.

b) Once the structure of the device has been installed and properly aligned, all track joints and cam follower guide rail joints shall be welded and ground smooth to assure that the related track and guide surfaces are smooth and without vertical and horizontal differences.

c) The design of the incline pallet device shall incorporate a means of expansion of the device to offset any wear in the main link bushings/connecting link pins or similar components.

d) The design of the means of device expansion shall include, at a minimum, the following items:

1. Overlapping design of the cam follower guide track so that the cam follower surface is always in contact with some portion of the guide track at the expansion joint.
2. Heavy-duty jacking-bolt arrangement to assist in expanding the device when needed.
3. Special attention is to be given to the design, manufacture and installation of the inner and outer perimeter finger guards as well as the vertical front face skirting at the expansion point.
4. The design, manufacture and installation of the special expansion joint perimeter finger guards shall assure that they do not create a snag point.
5. To further reduce the potential of snagging baggage at these expansion joints, the special finger guards are to be welded and ground smooth on the upstream end of each of the special guards.

2.5.25.6 Finish and Trim

a) All steel trim elements of the incline pallet device that are located in the public area of a terminal shall be 304 stainless steel with a #4 brush finish.

b) All trim elements shall be properly aligned both vertically and horizontally. Butt joints of adjacent stainless steel trim elements shall provide a smooth surface. Sharp edges on any of the stainless steel trim elements as well as voids between adjacent element joints are not acceptable. In addition, all radii of trim elements shall match.

c) Vertical skirting shall be no more than ¼” above the floor unless otherwise approved by Owner (or OAR).

d) All conveyor finishes and designs shall be coordinated with the Owner (or OAR). Submit catalog cuts and samples of the specified finishes (i.e.,

stainless steel, decking components) for review and approval by the Owner (or OAR).

2.5.25.7 Finger Guards

a) A finger guard consisting of minimum 12-gauge stainless steel formed side rails shall be installed. The gap between the pallets and the finger guard shall not exceed 3/32". The vertical and horizontal alignment of the adjacent butt joints of the finger guards shall not be misaligned nor is there to be any gap between the adjacent guards.

b) Special attention is to be given to the design, manufacture and installation of the stainless steel inner and outer perimeter finger guards as well as the vertical front face skirting at the expansion point of the incline pallet device.

c) The design, manufacture and installation of the perimeter finger guards at the device expansion points shall assure that they do not create a snag point. To further reduce the potential of snagging baggage at these expansion joint locations, the finger guards are to be designed and installed in an overlapping manner. The overlapping finger guards are to be welded and ground smooth on the upstream end of each expansion joint location.

2.5.25.8 Inner Guards

a) An inner perimeter guard/deck trim shall be provided in the public areas with stainless steel deck trim. The stainless steel trim for the interior decking of the device shall consist of a formed angle trim element of 12 gauge minimum stainless steel having minimum effective height of 6” to keep bags contained within the unit. The formed angle trim shall effectively act as a vertical skirting trim for the elevation difference between the pallets and the raised decking. The top of the formed angle shall overlap the deck by a minimum of 2” for carpet edge concealment (carpet is to be provided and installed by others).

b) An inner perimeter side guard shall be provided for slope plates installed in non-public areas. A painted steel inner guard shall consist of a formed angle inner guard element of 12 gauge minimum painted steel having minimum effective height of 6” to keep bags contained within the unit.

2.5.25.9 Decking

a) The top of deck shall be provided with a stainless steel finish and carpeting. Assume the responsibility to provide the stainless steel finish as illustrated in the Contract Documents. Carpeting on Claim Device decking is not part of the BHS scope of work, it will be provided by others. Assume the responsibility to coordinate the installation of the stainless steel finish with the finish that will be provided for the building columns (between the

two feed conveyors) and with the deck carpet installation (or other material) to provide a uniform finish for the claim device decking.

b) In the areas of the claim device deck, where carpeting is planned to be installed, provide each incline pallet claim device with a 3/4" FR-S rated fire resistant "tongue and groove" plywood decking, or fire rated Medium Density Fiberboard (MDF) decking, which shall be supported by a framework of FR-S rated fire resistant structural lumber or steel (e.g. 16 gauge 3/8” metal studs) that shall be designed for a dynamic load of 75 pounds per square foot.

c) In areas of the claim device deck, where stainless steel finish is planned to be installed, use only the fire rated MDF for decking. All plywood and MDF joints shall be properly aligned, fully supported by the deck support framework/structure and shall comply with the specified requirements in Section 064023 (Interior Architectural Woodwork), paragraph 2.2.

d) Provide hinged access door(s) (with appropriate stainless steel trim) in the decking in close proximity to each drive assembly, as illustrated in the contract documents. Additional access doors shall be provided as coordinated with the Owner (or OAR) over and above the access doors that are required at the drive locations to accommodate access under the decking for maintenance purposes. The access door(s) shall be of sufficient size to permit removal of the drive assembly components and allow for routine maintenance of the assembly. The access door(s) shall be equipped with flush mounted grab handles.

2.5.25.10 Transition Plate

a) A transition plate shall be designed and installed at the discharge end of each in-feeding conveyor for the smooth snag-free transfer of baggage onto the device. Special care shall be taken in the design and installation to ensure that re-circulating baggage on the device shall not be damaged or snagged by the plates. The discharge end of the plate should be extended past the inner perimeter guard. In public claim areas, the plates shall be of the same stainless steel type and finish as other trim elements.

2.5.25.11 Toe Kick and Molding:

a) A minimum 4-3/4" toe space shall be provided at the base of the front peripheral skirting.

b) Black vinyl cove molding shall be installed at the back of the toe space and shall be flush with the finished floor of the baggage claim area.

2.5.26 Roller Conveyor/Gravity Deck:

a) Roller bed section to be supplied with rollers installed in the high position. Rollers to be nominal 1.9" diameter x 0.065" wall on 3" centers.

b) Frame size shall be compatible with associated Ball transfer table.

c) Maximum load rating to be 100 pounds per roller.

d) Rollers shall be galvanized.

e) Beds, frames and supports shall be painted.

f) Roller conveyor in public area shall have a stainless steel shroud/cover (with toe kick) and end cap.

g) Rollers which can create a pinch point with guarding shall be “pop-up” type for safety.

2.5.27 Ball Transfer Tables

a) Frame size shall be compatible with associated roller conveyor and shall be minimum 10 gauge galvanized steel.

b) Ball transfers shall be 1 inch diameter on 4 inch nominal square spacing.

c) Ball transfers shall be easily removable for maintenance.

d) A cover plate shall be provided that exposes only the ball with ball retaining cup below minimize snagging of bag straps. Ball height above the plate shall be sufficient to allow easy transfer of luggage while preventing snags.

e) Beds, frames and supports shall be painted.

f) Table height adjustment shall be from nominally 10” to 36” Floor Supports

2.5.28 Floor Supports

a) The BHS contractor shall provide new floor supports up to 7’-6” in height, above the finished floor or the mezzanine below.

1. The BHS contractor shall provide the associated design and calculations and drawings, “signed and sealed” by a registered Professional Engineer (PE), licensed in the state (or jurisdiction) of the work.
2. The provided documentation shall show that the floor and hanging supports have been designed in accordance with the applicable codes.
3. The design loads shall be confirmed to be accommodated by existing Airport structure, and subject to the approval of the Owner (or OAR).
4. All BHS floor supports shall be constructed from #10 gauge or heavier material. Floor supports shall be vertically adjustable by at least three (3) inches in either direction and shall be of a heavy duty design, utilizing galvanized feet. BHS floor supports shall be located as follows:

i. Within one (1) foot of each associated component connection
ii. A maximum of five (5) foot centers on the load/unload baggage conveyors
iii. A maximum of ten (10) foot centers elsewhere within the BHS.

iv. All conveyors shall be adequately braced in order to ensure that there is no lateral or longitudinal displacement.

b) The associated floor supports shall be removable (for ease of BHS installation). Supports on removable conveyors and associated equipment shall use heavy duty casters.

1. The BHS contractor shall provide the bracing between the vertical support legs and the baggage conveyor bed frame (to ensure rigidity of the installed conveyors and associated equipment).
2. The BHS contractor shall anchor the floor supports (to the floor), using the fastening methods that are in keeping with the floor construction, and approved by the Owner (or OAR).

c) The associated power turns shall be floor supported (or as recommended by the manufacturer).

d) The BHS design and the installation of floor supports shall not prevent access to any floor vaults (for MEP and/or HVAC equipment). If any bridge-type supporting structures are required (in lieu of the vertical hanger rods), such structures shall be provided by the BHS contractor.

e) Floor anchors shall be wedge type Red Head Trubolt 3.75"x.375" (or equivalent) not extending more than .75" above base plate and female sleeves flush with the floor.

2.5.29 Hangers

a) The BHS contractor shall provide associated design and calculations and drawings, “signed and sealed” by a licensed Professional Engineer (PE), registered in the state or jurisdiction of the work, showing that the ceiling supports have been designed in accordance with local and state codes.

b) The design loads shall be confirmed to be accommodated by existing Airport structure, and subject to the approval of the Owner (or OAR).

c) The BHS hangers shall be spaced at a maximum of ten (10) foot centers. Discretion shall be used in locating hangers, except where specific requirements are shown on the drawings.

1. The ceiling hangers shall be limited to a maximum load of 750 pounds each. All ceiling supports shall be three-quarter inch (3/4”) diameter “threaded rod” vertical hangers, with not less than two inch (2”) by two inch (2”) by one-quarter inch (1/4”) angle, horizontal members. Provide a minimum of six inches (6”) for vertical adjustment.
2. All hanger connections shall be installed with safeguards to avoid loosening, due to vibration (with sway bracing installed) to provide rigidity on installed conveyor sections.

3. Do not use side-guards to provide support for conveyors or other equipment. Do not weld anything to the building structural steel, unless pre-approved by the Owner (or OAR).
4. Power turns shall be supported and attached, as recommended by the power turn manufacturer.

d) BHS Overhead Attachments:

1. Overhead attachments shall be designed to avoid the transmission of excessive conveyor periodic or momentary loads into the existing Airport structure. The Owner (or OAR) shall determine the acceptability of each specific condition.
2. The BHS contractor shall replace all fireproofing materials removed during installation with approved asbestos-free material to an equal fire-rating at the attachment locations.

2.5.30 Platforms and Access Ladders

2.5.30.1 Platforms

a) The BHS contractor shall design, fabricate and install platforms and associated access ladders and handrail for the BHS (where shown on the drawings, or as required for safety, proper operation and maintenance).

b) The specifications for suspending the platforms shall be generally the same as that for suspending conveyors. The platform transitory working live load shall be a minimum of 25 pounds per square foot, with deflection limited to 1/180 of the unsupported span length, under a concentrated 250 pound load.

c) The BHS contractor shall coordinate the walking surface of the #10 gauge HRS “Bar Grating”, with the Owner (or OAR).

1. The minimum platform width shall be nominally thirty-six inches (36”), with a six inch (6”) gap between the platform and the conveyor.
2. Level platforms shall have a smooth surface. Inclined platforms of eight degrees (8°) or greater shall be equipped with an anti-skid walking surface. Steps shall be used if an elevation change is greater than eight inches (8”).

d) The minimum head clearance to be provided shall be 6’-0”. All obstructions less than 6’-0” above the grate height shall be wrapped with reflective “safety tape” and compressible open cell material (padding).

e) Platforms shall have four inch (4”) high toe boards, except where they might interfere with conveyor access. All platforms and toe-boards shall comply with applicable U.S. OSHA standards and local codes. Clearance above platforms shall be a minimum of forty-four inches (44”), with a ¼ design objective of seven foot–zero inches (7’-0”). Where platforms are

necessary for access or maintenance, the conveyor shall be supported by a sill, (common to the platform).

f) Platforms shall include swing gates or off-sets, at access locations (per OSHA standards 1910.23). Provide padding, rounded corners, smooth surfaces and any other acceptable measures to ensure safety.

2.5.30.2 Stairs

a) Provide stairs as shown on the Contract Drawings (or as required), to ensure personnel access to the BHS. The BHS contractor shall show the final number and locations for all stairs and/or ladders, on the submittal drawings.

b) The stairs shall have a maximum rise of eight inches (8”), a minimum run of nine inches (9”), a minimum tread width of nine and one-quarter inches (9-¼”) and shall be at least thirty-four inches (34”) wide.

c) The maximum pitch for stairs is thirty-eight degrees (38°). Flights shall be uniform within one-eighth inch (1/8”). Intermediate flights shall not exceed twelve (12) steps. The required headroom above the stairs is six-foot six-inches (6'-6").

d) Stair tread shall have a non-skid upper surface and be designed in accordance with OSHA section 1910.23 and 1910.24.

2.5.30.3 Handrail

a) All BHS handrails shall be designed per OSHA code of Federal Regulation Part 1926.500. Handrails shall be installed on all associated platforms and stairways, except where directly adjacent to conveyors.

b) The handrails shall be thirty-four inches (34”) to thirty-eight inches (38”) above the platform or stair.

c) Handrail vertical supports shall be spaced on not more than 8’-0” centers.

d) Handrails for stairs shall be welded. Handrail ends shall be closed with a welded metal cap. The BHS contractor shall coordinate handrail style with the Owner (or OAR).

e) Hand rails shall be a minimum of three inches (3”) clearance all around.

2.5.30.4 Ladders

a) Vertical Ladders

1. Vertical Ladders shall not be used unless approved by the Owner (or OAR).
2. Fixed vertical ladders shall only be used where space does not permit the use of stairs or ships ladder. This includes any additional maintenance ladders (as required) to ensure safe access for all personnel who operate, maintain, or have access to the BHS.

3. Provide a safety chain and safety cage on ladders above eight foot (8') or as required by federal, state and local codes. The BHS ladders, rungs and handrail shall be Hot Rolled Steel (HRS) and shall meet or exceed OSHA standards, section 1910.23, 1910.26, 1910.27, 1926.500 & 1926.501.
4. All rungs shall be uniform spacing, less than twelve inches (12"), minimum, three/quarter inch (¾") diameter, sixteen inches (16") wide, and support a load of four-hundred (400) pounds.
5. Ladders and hand rail shall be a minimum of three inches (3") away from any wall.

b) Ships Ladders [Fixed]

1. Fixed vertical ladders shall only be used where space does not permit the use of stairs. The BHS ladders and handrail shall be steel and shall meet or exceed OSHA standards, section 1910.23, 1910.27, 1926.500 & 1926.501.
2. The treads and stringers shall be slip resistant and capable of supporting a five hundred (500) pound load. The treads shall be a uniform distance with a maximum of twelve inches (12"). The pitch for ships ladders shall be between fifty degrees (50°) and sixty-seven degrees (67°).

c) Swing Down Ladders (Counter Balanced)

1. The BHS contractor shall provide (counter balanced) swing down ladders as shown on the Contract Drawings (or where otherwise required) to allow safe access to platforms and walkways.
2. Swing down ladders shall fold up in the direction of tug lane travel and shall be equipped with "flashing" amber beacon that shall be activated when the ladder is not in the fully "up" position, (detected by a limit switch or photoeye). BHS swing down ladders shall be held in the "up" position by a mechanism, (when not in use) and the mechanism shall allow the ladder to be lowered, by using no more than five (5) pounds of force.
3. The swing down ladders shall be Type A aluminum, with three hundred and fifty (350) lbs. rated capacity, and a minimum of twenty-five and one-half inches (25.5") wide. The pitch for swing down ladders shall be between fifty degrees (50°) and sixty-seven degrees (67°). Treads shall be slip resistant and shall be a uniform distance with a maximum of twelve inches (12").

2.5.31 Protective Guarding

a) The BHS contractor shall provide and install removable protective guarding beneath the associated conveyor beds, and around the conveyor drives, for all

inclines and declines, one-foot six-inches (1’-6”) above finished floor to seven-foot six-inches (7’-6”) above.

b) The protective guarding shall be sheet metal or expanded metal with the opening sizes in accordance with ANSI B 20.1. The protective guards shall extend at such a distance that a person cannot reach behind it and become caught in the space between the belt and pulley. The underpans, regardless of type shall be hinged and pinned for easy maintenance access; the pin shall have a lanyard attached to reduce potential of losing the pin. Sheet metal screws will not be accepted.

c) If building constraints cause the BHS support structures to be less than 8'-0”, the structure, framework, support etc., shall be encased in protective cushioning material (padding). Low overhead conditions shall be identified with safety marking tape (yellow / black striped). Provide and install prominently located “Low Overhead Clearance” warning signs.

d) The BHS contractor shall provide adequate protection from falling objects (in work areas or aisles located beneath the overhead portions of the BHS) with gap pans, netting, etc. The BHS contractor shall provide and install protective cushioning material (padding), where conveyors pass over a walkway, maintenance access areas, etc. (to prevent injury to operations and maintenance personnel).

e) The BHS contractor shall provide personnel protection at all BHS platforms and walkways to ensure that any potential injury is minimized. This includes swing gates, or off-sets at access locations (per OSHA standards 1910.23).

f) The BHS contractor shall paint all the protective guarding, (including the pipe guards around load areas, and at associated MCPs) with OSHA #1016 or #1026 “Safety Yellow” paint.

g) The BHS contractor shall provide finger guards (at the end rolls) for all the associated loading and unloading conveyors.

h) Provide a chain and safety cage on ladders above eight feet (8’-0”), or as required by state and local code.

2.5.32 Impact Protection

a) The BHS contractor shall (at a minimum) provide the impact protection as shown on the Contract Drawings and match the Airport standard guard rail system. Adequately protect the BHS conveyors, MCP’s and all other associated equipment.

b) The BHS contractor shall design the impact protection to withstand the impact of a standard tug and fully loaded cart travelling at a speed of six (6) miles per hour (minimum).

c) Construct the impact protection and supports of structural steel, heavy walled sections. Securely fasten all the impact protection components to each other,

and anchor them to the floor. The BHS operational and maintenance access to the associated protected equipment shall not be restricted by the provided impact protection.

d) Provide individual bollard-type impact protection around associated MCPs, and throughout the BHS, (where required). Bollards shall be constructed from steel pipe, concrete filled with crowned caps. The minimum diameter for the BHS bollards is eight inches (8"). BHS bollards that are exposed to the weather shall be hot-dip galvanized. The bollards that are not exposed to the weather shall have primer applied, and then painted with OSHA #1016 or #1026 “Safety Yellow” paint.

2.6 BHS ELECTRICAL REQUIREMENTS

2.6.1 Motor Control Panels

a) Motor Control Panels (MCPs) shall consist of floor-mounted sheet steel “Hoffman” or approved equal enclosures, with hinged doors, and key locks.

1. All Motor Control Panel enclosures shall be NEMA Type 12, except those outside and/or exposed to direct rain, which shall be Type 3R or 4 Weatherproof.
2. The exterior of the MCPs shall be gray.
3. The interior of the MCPs, (including the back panels) shall be white.

b) All BHS Motor Control Panels shall be designed and fabricated by an electrical control’s company with a history of 5 years’ experience with systems of similar size and complexity.

1. MCPs shall be delivered to the site, fully designed, manufactured, programmed and pre-tested (ready to install and terminate the associated field wiring).
2. Each Motor Control Panel shall be provided with an Underwriters Laboratory “UL” sticker, affixed to the back panel, adjacent to the disconnect switch.

c) The MCP main power disconnect switch shall be a heavy duty fused switch (for 480-Volts, 3 Phase, 60Hz).

1. The main disconnect shall be Allen-Bradley or approved equal.
2. Provide a Plexiglas Safety Shield with standoffs (or similar suitable protection) over the main fuses.
3. The main fuses shall be a maximum of 600A - RK1 fuses. The main fuses shall be sized for an additional 30% code motor load.
4. The main disconnect shall be installed inside the MCP housing with the operating handle arranged to open or close, with the doors of the control panel in the closed position.

d) To minimize the possibility of any ground water damage to the MCP's located outside of the BHS control room, the BHS contractor shall be responsible to ensure that a minimum 4" thick concrete pad is installed for the MCP's to be mounted on.

e) The door opening mechanism shall have a "manual override" provision to permit the opening of the door, (by qualified personnel), with the power "On".

f) An open type motor starter with circuit breaker, motor protector switch, or fuses shall be installed on the interior back-panel for each associated BHS conveyor motor.

g) Each motor starter and each control device within the MCP shall be provided with a nameplate (for maintenance and troubleshooting purposes).

h) The BHS contractor shall provide LED light fixtures inside each MCP to properly illuminate the electrical equipment and tags, which shall turn "On" when the MCP door is opened.

   1. The light fixtures are to be fed from the "line side" of the MCP power source, and shall remain on, even if the MCP main disconnect is off.
   2. The "hot" wires providing power to the light fixture shall be "Yellow", with guarded terminations to protect personnel from accidental contact.
   3. Provide a door switch inside the panel (to control the light fixture) that is activated by the main panel door. Use a single pole switch rated at 20 amps and 120 volts.

i) The BHS contractor shall provide a 120v, 20-amp duplex receptacle in each motor control panel for powering a laptop computer or other programming device.

   1. The outlet shall be fed from the "line side" of the MCP power source, so that the receptacle shall remain powered, regardless of the condition of the MCP main disconnect.
   2. The "hot" wire providing power to the outlet shall be "Yellow". All terminations of this "Yellow" wire shall be guarded, in order to protect personnel from accidental contact.
   3. Mount a warning label on the inside and the outside of the MCP, next to the disconnect switch stating:

      "CAUTION" - THIS MCP CONTAINS "YELLOW WIRES" WHICH SHALL REMAIN "HOT" WHEN THE MAIN DISCONNECT SWITCH IS TURNED OFF.

j) Provide thermostatically controlled cooling fans (if required by conditions) within the MCP cabinet to monitor and prevent internal temperatures from exceeding component environmental limits that are sized based on an ambient temperature of 100° F (configurable).

   1. Provide replaceable or cleanable filters on the intake vents. Configure, through appropriate controls functionality, the cooling fans to run when the

respective subsystems are operational and the pre-set ambient temperature is exceeded. The MCP cabinet over-temperature (e.g., 120° F) shall be monitored by then modified existing MDS

2. When the MCP temperature exceeds the pre-set limit (which shall be configurable) a distinct alarm message shall be displayed on the MDS graphics and text displays. Provide separate circuits for the power and control of the MCP cooling fans; Note that these circuits shall originate within the respective MCP.

k) The BHS contractor shall provide an 18” (minimum) rectangular or square system static map, showing the annotated system layout for the conveyors and devices controlled by the MCP.

l) Each motor control panel shall have pushbuttons, pilot lights, etc. which shall include the following:

1. Off/On key switch
2. Illuminated Start pushbutton
3. Non-illuminated Lamp/Alarm pushbutton
4. Non-illuminated Alarm Silence pushbutton
5. Illuminated Fault Reset pushbutton
6. Illuminated E-Stop pushbutton

m) The MCPs are equipped with audible and visual alarms including, at a minimum:

1. Start Warning Beacon (Amber)
2. E-Stop Activated Beacon (Red)
3. Start/Fault/Estop Audible Alarm

n) The working space in front of the MCPs shall be a minimum of 42”. (In all cases), and 78” minimum in height.

1) The workspace shall permit at least 90 degree opening of all the MCP doors.
2) Refer to the current applicable National Electrical Codes to determine working space requirements.

o) The BHS contractor shall provide a laminated card showing the associated system’s motor schedule with horsepower, fuse size and overload heater size (affixed to the inside of the MCP door).

p) BHS MCPs that are not located on a raised curb (or raised floor), shall be provided with a concrete or galvanized steel plinth, pedestal, legs or similar means to raise the MCP (a minimum of 4 inches above the floor). This shall minimize the possibility of ground water damage to the MCPs located outside of the BHS control room.

q) All MCP documentation shall be provided in hard copy located within the MCP door pocket, (for reference). This documentation shall include but not be limited to:

1) Electrical Schematics
2) VFD Settings
3) MCP Layout
4) Motor manifest with corresponding spare parts list

2.6.2 Automatic Tag Reader (ATR)

a) The ATRs shall be capable of determining the bag's sort code at a rate of not less than 80 bags per minute for tags as herein defined.

b) The ATR should be designed to automatically scan airline bar-coded baggage tags attached to a wide variety of checked baggage.

c) The ATR shall be capable of decoding a minimum of 80 baggage tags per minute being conveyed at speeds of up to 400 fpm with a minimum bag separation of 6" between bags.

d) The Installation of the ATRs shall be compatible with BHS contractors control system. Connectivity shall be compatible with the BHS control system design, using protocols such as Ethernet Network interface with TCP/IP, EthernetIP or ControlNet.

e) Environmental

1. The ATR shall operate without malfunction within a temperature range of 32° F to 122° F (0-50°C) with a relative humidity of 0 to 99% non-condensing.
2. If the scanner array or components cannot operate within this range, enclosures should be provided with the proper environmental control devices such as but not limited to heating, cooling, ventilation, and filtering of airborne contaminants to provide an operating environment that will conform to the manufacturer’s electrical and mechanical requirements.

f) Scanner Array Controller (Redundant Operation)

1. Each scanner array controller has an independent link to the BHS control system.
2. Each scanner array controller shall provide a network connection to the ATR. Each independent network interface from each ATR head is networked together and connected to its appropriate scanner array controller.
3. Each scanner array controller shall provide field connections for an independent photoelectric scanning zone sensor and direct-coupled tachometers.
4. Each scanner array controller shall send only one message for each bag detected in the scanning zone.
5. The scanner array controller will detect when a scanner head, network interface, power supply, photoelectric scanning zone sensor or direct-coupled tachometer failure occurs. The primary scanner array controller will enunciate the fault condition at the scanner array by means of its light tree indicator pole as well as the diagnostic software system located remotely.

6. Upon any failure affecting the primary scanner array controller or those components interfaced to the primary scanner array controller, the secondary scanner array controller will automatically take over ATR operation.
7. h. Each scanner array controller shall have a 4-color light tree indicator pole. The lights are designated as follows:
    i. Green: Controller/Scanner Array Active
    ii. Red: Controller/Scanner Array Failure
    iii. White: Controller in Stand-By Mode
    iv. Blue: Good Read
8. Provide a laptop computer interface local to each scanner controller.

g) Read Rates

1. The minimum monthly read rate for the ATR for originating baggage shall be at least 95% during normal operation for all IATA 10-digit license plate baggage tags, IATA 10-digit fallback tags, and 4-digit city code tags. This percentage does not apply to handwritten tags or noncompliant tags that will negatively impact actual read rates.
2. Each ATR shall achieve a minimum read rate of 99% during controlled testing.
3. Each ATR shall not exceed an error rate (misread rate) of 0.1%.

h) Diagnostic Software System

1. The diagnostic software system running on a PC and located in the control room is designed to provide maintenance data and statistical information about the scanner array's performance.
2. Each scanner array controller will interface to the diagnostic software system by means of an Ethernet interface with TCP/IP protocol.
3. For remote maintenance servicing, the diagnostic software system can be accessed remotely by means of a PC modem connection enabling a qualified service technician to help evaluate and diagnose ATR problems down to the individual scanning head.
4. The diagnostic software system enables the remote monitoring and download of log files.
5. The diagnostic software system includes the following:
    i. System List: Screen displays the System ID, System Name and IP address (array designation), Device ID, and current day read rates.
    ii. Long Term Read Rate Data: Screen displays of Long Term Read Rate Overview (total log period by array) and Long Term Read Rate Detail (by day, by array).
    iii. Daily Statistics: Screen displays daily statistics (by day, by array, by scanner head) and daily statistics by selected scanner head groups (by day, by array, by group).

iv. Exclusive Scanner Read Rate: Screen display of the frequency of when only ONE scanner head read the baggage tag during the scanning zone (by array, by head).
v. Daily Course: Screen displays hourly read rates (by hour, by array).

6. Histograms: Screen displays of object length, object gap, multiple read occurrences, and X/Y/Z positions of the baggage tags read.
7. System Info: System documentation screens
8. Download Page: Screen containing raw data files (by day, by array)
9. Alarm Settings: Specific screens enabling the maintenance group user programmability to preset alarm conditions for ATR failures or declining scanner head performance.
10. Employing the diagnostic software system in the airport design enables the implementation of optional touch-screen displays for viewing the diagnostic software system screens locally at the ATRs.

2.6.3 Bag Measuring Array (BMA)

a) The BMA shall be provided by the same supplier as the ATR as an integrated system.

b) The BMA will have the same or higher processing rate as the ATR and will be configured with redundant controllers similar to the ATR.

c) The Installation of the BMA shall be compatible with BHS contractors control system. Connectivity shall be compatible with the BHS control system design, using protocols such as Ethernet Network interface with TCP/IP, EthernetIP or

d) The BMA shall measure each bag for height, width and length to determine Out-Of-Gauge bags for the EDS screening machines employed by this project.

e) Diagnostic software will be provided for the BMA running on the same remote terminal as the ATR diagnostic software. The diagnostic software will offer similar statistics as the ATR software relating bag dimensions and BMA equipment related events and performance measures.

f) The BMA shall be set to the most restrictive height, width and length of the EDS being employed. The tolerance for measuring a bag must be set to not allow baggage which can cause a jam at the EDS while not sending an excessive number of bags to the CBRA. The BMA shall communicate with the Baggage System as to the “Go/No-Go” size of the bag.

2.6.4 Electrical Service to be provided

a) Refer to the Electrical specification sections for the design and construction building infrastructure improvements and other requirements for power supply to the BHS system.

b) Prior to shutting power off to any existing systems, the BHS contractor shall confirm that power shut down shall not impact the Airport operations.

c) The standard voltages for the Airport are:

1. 480 volts, 3 phase, 60 hertz - primary
2. 120 volts, 1 phase, 60 hertz - secondary

d) Power for the various subsystems shall be provided at locations shown on the Contract Drawings prepared by the BHS contractor's electrical engineer.

1. The Full Load Amp (FLA) rating shall be indicated on the Contract Drawings. It shall be the BHS contractor's responsibility to verify the FLA requirements and notify the Owner (or OAR) of any increase or decrease.
2. Each Power Distribution Point (PDP) that is dedicated for the BHS shall consist of cables in an appropriately sized junction box (supplied and installed by the Airport's Electrical Contractor and connected at its source to an appropriately sized circuit breaker (located at the building substation panel). The power drop shall terminate with approximately 20' of coiled cable.

e) The BHS contractor shall provide and install all the required main cables from the dedicated Power Distribution Points (PDP) to the various BHS distribution boards, and onward to the associated MCPs, (as necessary to meet the requirements of the specification).

1. The BHS contractor shall be responsible for all the electrical work downstream of the PDP locations, including the BHS distribution boards, associated MCPs, and all other conduit and wiring in between.
2. The BHS contractor shall be responsible for all the power connections from the associated MCPs to all the other BHS equipment**.**
3. The BHS contractor shall size the power feeders from the power drops at 125% of the minimum NEC (or applicable local code) permitted size for the full load amps required.

f) The BHS contractor shall provide and install all the services, feeders and disconnect switches for branch circuits to each associated motor control panel, (with separate circuits for each subsystem).

g) The BHS contractor shall also provide and install all necessary panel boxes, conduits, wireways, conductors, breakers/fuses, transformers and any other equipment and/or materials required to complete the electrical power distribution for the operation of the baggage handling systems. Refer to NEC Article 300 (latest version) for wiring methods.

h) The amperage shown for each PDP in the Contract Drawings shall be confirmed by the BHS contractor in his bid submission.

1. The BHS contractor shall provide detailed power calculations for review and approval by the Owner (or OAR).
2. Coordinate the detailed power requirements (including any increase / decrease) with the Owner (or OAR).

i) Provide separate circuits for controlling Programmable Logic Controllers (PLCs), powered fire/security doors, etc. Note: These circuits shall originate within the associated MCPs.

j) The BHS contractor shall calculate the electrical power supply requirements on the basis of the total connected load, (with a diversity factor). Per NEC, Size the conductors to ensure that the voltage drop does not exceed 2% at the farthest outlet of power.

k) Provide 120 volt, single phase, 60 Hertz power for operation of the BHS control circuits. The control power for each associated MCP shall be obtained by means of a transformer connected to the load side of the 480 volt input power.

l) All baggage handling systems that use programmable logic controllers shall be equipped with the appropriate number and size of power regulators (to ensure that the power for the respective PLCs is properly conditioned). Power regulators shall be of the type manufactured by the Sola Corporation (or approved equivalent).

m) All electrical equipment, components, devices and accessories shall be listed, labeled and identified as being suitable for their intended use by the testing agency (acceptable to authorities having jurisdiction). This shall include MCPs and any control panels or cabinets, whether factory or contractor fabricated.

a) The supplied control systems and equipment shall be compatible with, and operate reliably and effectively with, the normal electrical supply typically available.

b) The equipment shall not be unduly sensitive to fluctuations in supply voltage which may typically vary by plus or minus (+/-) ten percent (10%) of nominal values.

c) Electrical power supply filters/conditioners and/or regulators shall be supplied for all equipment, which cannot meet the specifications stipulated.

2.6.5 Emergency Power

a) Coordinate this with the airport (or OAR), general contractor and power systems to be installed in each area. The conveyor systems to be on emergency power are as follows (all except MF1 and MU1):

Conveyors: TC1, TC2, SF1, OG1, OS1, SS1, SS2, OSR1, OSR2, AL1, CL1, CL2, CL3, CL4, MF2, NR1, MU2

MCPs: MCP1, MCP2, MCP3, MPC4, MCP6, MPC7

2.6.6 Power for Subsystem Devices

a) For each required service disconnect, the BHS contractor shall furnish and install all feeders and disconnects for each BHS branch circuit.

b) The BHS contractor shall provide and install all the associated MCP's, transformers, circuit breakers, fuses, wire ways, conduits, conductors, equipment, and materials required to complete the electrical power distribution (for the operation of the systems).

c) The BHS contractor shall show on the shop & installation drawings, the electrical power requirements, and circuit breaker sizes for each associated PDP and MCP.

d) The BHS contractor shall furnish and install all the required 120 VAC, single phase control power, by means of a transformer located in the associated MCP (required by each subsystem).

2.6.7 Uninterruptible Power Supply (UPS)

a) The contractor shall furnish and install one UPS to provide a minimum of one (1) hour of power to PLCs and provide power to all redundant server computers, switches, status monitors, ATR/BMA controllers and BSDs during a power outage, prior to emergency power activation.

b) This unit shall have a network connection for supervision of the UPS's on-line health including any fault conditions. Power outages shall be alarmed on MDS.

c) The system shall be designed to "auto-recover" without human intervention after a power outage and or UPS failover. The procedure to start the system should also be detailed should components fail to auto start. This procedure should be submitted and coordinated with the airport. This applies to items not limited to but including servers, switches, monitors, PLCs, ATR/BMAs and their controllers and components, BSDs, etc.

d) All BHS Computers and all PLCs for outbound and CBIS subsystems for which baggage tracking is required shall employ an Uninterruptible Power Supply (UPS) system(s) capable of storing data for a minimum period of one (1) hour should a power outage occur. All tracking data shall be stored in the PLCs during a power outage so that when power is restored and the conveyors begin running again, baggage will be sent to the appropriate output.

e) Provide all power hardware (e.g. conduit and wiring) from the 120 VAC PDPs to the UPS and onto the receptacles (including all receptacles) for the BHS related equipment within the CBIS area and the Operations Control Center area. Coordinate all BHS electrical requirements with the owner.

2.6.8 Motor Safety Disconnects (MSDs)

a) The BHS contractor shall furnish and install motor safety disconnect switches for each motor in the system, per ANSI B20.1. The disconnect switches shall be heavy duty, 480VAC, 3 Phase, (NEMA Rated for the application) with an auxiliary contact (120VAC) to report the status to the associated PLC, (for system monitoring).

b) The BHS motor disconnect switches shall be located within three feet (3') of the associated motors, in a visible and easily reachable location.

c) MSD's shall be (lockable in the "Off" position) UL listed and comply with NEC and Local code requirements, (whichever is more stringent).

d) If motors with clutch/brakes are provided, the disconnect switch shall shut off the motor and clutch/brake simultaneously and have an auxiliary contact to report the status of each disconnect (to the PLC) for system monitoring. BHS Motor Safety Disconnects

e) All BHS motor safety disconnects shall be identified by a unique number and shall be located 1" above the disconnect switch.

f) The BHS motor safety disconnect label shall read as follows: MSD/ (Conveyor ID) – (unique number). i.e. MSD/TC2-07

2.6.9 Electrical Conduits

2.6.9.1 BHS Conduits

a) Unless otherwise approved, all BHS electrical wiring shall be run in rigid galvanized steel conduit (with galvanized threaded fittings and couplings) ¾" or larger, when located 10' or less above the finished floor; and EMT ¾" or larger above 10'.

b) Conduit shall not be run along the floor (or platform) or in any manner that blocks or restricts maintenance, personnel movement or the intent of quick release conveyor sections associated with EDS.

c) Floor mounted conduit shall be mounted above the floor, on 1-7/8" Unistrut minimum or other equivalent mounting hardware and allowed only in non-accessible areas unless otherwise approved by the Owner or OAR.

d) The BHS conduits shall be grouped together (as much as possible). Conduits shall be installed by supporting them from the building wall, using "uni-strut" type mounting channels (to provide clearance to the wall).

1. Conduits shall not be welded to structural members.
2. Conduits shall not be mounted on power turn side guards.
3. Conduit should be run as to not impede maintenance access.
4. Conduits shall be fixed securely to the walls, ceiling, or other adjacent structures by means of mild steel hangers, or brackets of adequate mechanical strength. The hangers or brackets shall be painted with anti-rust epoxy paint.
5. Attachments for conduit shall be provided at regular intervals not exceeding 48" for straight run and at a distance not exceeding 8" on both sides from a bend or intersection.
6. A minimum clear space of ¾" shall be left behind all cable trays.

e) All Liquid Tight / Flexible Conduit shall be a minimum of ¾".

1. Install liquid-tight flexible conduit for connection for electrical equipment where subject to movement and vibration. Provide appropriate liquid-tight fittings.
2. Use liquid-tight flexible metal conduit for final connection to motors, photoeyes, limit switches or any device, which may require adjustment after installation (objective shall be not to exceed 3’ in length).

f) All BHS electrical conduits, fittings, etc. (entering any enclosure, pull box, etc.), shall be equipped with appropriate bushings, to prevent damage to the wire insulation.

g) All BHS electrical conduit fittings shall be of the compression type.

h) Intermediate Metal Conduit (IMC) type conduit is not acceptable.

i) The BHS power wire (480 volts) and low voltage control wiring (less than 90 volts) shall be run in separate conduits.

2.6.9.2 BHS Raceways

a) All BHS raceways shall be concealed in public and finished areas.

b) All BHS raceways shall run parallel to, or perpendicular with, building column lines.

2.6.9.3 BHS Wireways

a) Divided 4” x 4” metal wireway (16 gauge minimum) may be used to route power wires and controls wires to the BHS devices. All BHS wireways shall have hinged covers and insulating pads on the inside radius of internal bends, (at all elevation and horizontal changes).

b) The BHS wireways shall be visually inspected after the installation of insulating pads, and prior to installing any cable or wire. Open wireways shall not be acceptable.

c) The BHS wireway design and installation shall be of the “lay-in” type, (to avoid the need to thread wires through wireway ends and transition connectors).

d) Any BHS wireway installed below a conveyor bed section shall not interfere with maintenance access or the transport of large maintenance parts or rods underneath conveyors.

e) All cable routing methods shall be approved by the Owner (or OAR).

2.6.9.4 BHS Electrical Boxes

a) All BHS junction boxes, outlet boxes, pull boxes and cover plates shall be suitable to use with rigid and/or EMT conduit,

b) All BHS electrical boxes shall conform to the National Electric Code for minimum wiring space requirements and material thickness.

c) All BHS electrical boxes shall have screw fastened covers.

2.6.10 Conductors (Wires)

a) All BHS power wires shall be a minimum of #12 AWG, 600 volts, type THHN or THWN, insulated, stranded, copper wire.

b) All BHS control wires (except for electronic circuits and cord & plug type devices) shall be a minimum of #14 AWG, 600 volts, type THHN or THWN, insulated, stranded, copper wire, and rated at not less than 90 degrees C.

1. BHS electronic circuit wiring shall be a minimum of # 18 AWG, copper wire.
2. BHS electronic multi-conductor cable assemblies shall be made up of single conductors, enclosed in shrinkable polyvinyl chloride plastic tubing.

c) Any BHS flexible multi-conductor cords for other than electronic applications shall be type SO or SOJ.

d) All BHS connections shall be made with wire of current carrying capacity consistent with the load and duty-cycle.

e) Electrical power and control wiring shall not be run along the side of any conveyor side guards.

f) BHS wiring shall be run continuously from one piece of apparatus to another without splices in any conduit.

g) Keep all wires on their reels (while being pulled) and do not allow the wires to contact the ground or floor.

h) Provide a minimum of 5% spare conductors in all conduit home runs, with a minimum of two (2) spare control wires and one (1) spare power wire.

1. Label the wires as spares (with unique Owner approved numbers)
2. Spare wires shall be terminated within a terminal block and labeled accordingly.

i) Install one (1) green insulated, 600 Volt, stranded, copper, ground conductor, in each conduit and raceway.

j) BHS Wire Splicing

1. The BHS control power, neutral and ground wiring may be spliced at easily accessible junction boxes (using appropriate terminal blocks).
2. Splicing of any BHS control (signal) wire is not acceptable.
3. BHS control stations, pull boxes, raceways, etc., shall not be used for wire splicing.

k) BHS Wire and Cable Identification

1. Power Wiring – Line Side

a. 480V – Brown – Orange – Yellow

2. Power Wiring – Load side

   b. Wire markers with MCP #, Conveyor name and T1, T2, T3, (depending on the phasing of the wire).

3. Control Power Wiring

   c. AC Control Power – Black
   d. AC Control Neutral – White
   e. AC Control Signal – Red
   f. DC Control Positive – Blue
   g. DC Control Negative – Blue/White Stripe
   h. Mechanical Ground – Green

2.6.11 Junction Boxes

a) All BHS junction boxes shall conform to NEMA standards.

b) The use of conduit opening reducers is not acceptable for BHS applications. All conduit related openings in enclosures, pull boxes, etc. shall be of the appropriate size for the respective conduits.

c) Hoffman NEMA rated watertight conduit knockout closers are acceptable, (for closing unused openings).

d) All BHS junction box covers shall be permanently identified with the system name, circuits and destination and originating circuit location (from and to).

2.6.12 Electrical Equipment Identification

a) Each BHS control station, and control device enclosure shall be supplied with laminated, (permanently attached), corrosion proof, etched, engraved or stamped identification plates, providing the device name. “Dymo”-type labels are not acceptable.

b) Each BHS control operator and indicator shall be supplied with laminated, (permanently attached), corrosion proof, etched, engraved or stamped identification plates, providing the device name. The lettering shall be a minimum of 1/8” characters, using black lettering on white background.

c) All BHS control stations shall be identified by a unique identification with a minimum of 1/4” characters, using black lettering on white background name plates. The BHS control station label shall be as follows: CS/ (Conveyor ID) – (unique number) i.e. CS/TC2-07

d) Estop pushbutton labels shall have a red background with white lettering, providing the device name and the estop zone conveyors involved. The lettering shall be a minimum of 1/8” characters, using black lettering on white background.

e) In addition to the manufacturer’s nameplates, all BHS electrical and mechanical control devices mounted in or on the associated MCPs shall be further identified by permanently attached, corrosion-proof, etched, engraved or stamped

identification plates. The BHS MCP component identification shall be provided on the back panel so that all transformers, relays, motor starters, fuses, overloads, circuit breakers, etc. can be easily identified. The lettering shall be a minimum of 1/8” characters, using black lettering on white background.

2.6.13 Control Stations

a) Spacing between control stations shall not exceed 50 feet and shall be coordinated with the Owner (or OAR).

b) Control stations in the non-public areas shall be painted OSHA #1016 or #1026 “Safety Yellow”.

c) The BHS contractor shall install full size (30.5mm) control station operators (i.e. pushbuttons, selector switches, indicator lights), in control stations.

   1. The control operators shall be grouped to minimize the number of operating points throughout the BHS.
   2. Control station operator functions shall be identified in the English language (using elementary terms).
   3. All control station operator identification plates shall be affixed to the console face.
   4. All visible pushbutton lights and indicators shall be LED lighted.

d) Mount all control stations located in public areas (i.e. load belts, and curbside) flush to the equipment and provide them with Type 304, 12 gauge, #4 brushed finish, stainless steel cover plates. Control stations located in the view of the public shall not be mounted on the top surface of the conveyor front cladding.

e) Control Stations located in public view with hinged doors shall have industrial grade metal hinges and a lockable latch.

f) Provide control stations as indicated on associated drawings and specifications. Final control station locations shall be coordinated with the owner (or OAR) on the installed conveyor and associated conveyor equipment.

   1. Position control stations so they don’t impede access to the equipment for operation or servicing. Locate control stations so they are clear of normal vehicular and personnel traffic lanes. Install guards to prevent the inadvertent actuation of any control device where this cannot be accomplished.
   2. Indicator lights shall not be affected by extraneous light, and shall be clearly visible in all lighting conditions

g) Control elements such as (but not limited to) switches, pushbuttons, indicator lights, etc., shall be easily replaceable and adequately protected from physical damage, and shall be selected for ease of operation in an "AOA" environment.

h) Freestanding control stations shall be mounted on extremely rugged and braced pedestals with large firmly anchored base plates. The design of this equipment shall account for extraneous loading and generally abusive conditions.

i) Provide independently anchored impact protection wherever MCPs, control panels, control consoles or control stations are exposed to work area traffic.

2.6.14 Photoeyes

a) All BHS photoeyes shall be identified by a unique number, which shall be located within 2” of the photoeye location.

b) The BHS photoeye label shall be as follows: PE/ (Conveyor ID) – (unique number). i.e. PE/TC2-07

c) Provide photoeyes that are self-contained, retro-reflective type with an infrared light source, a sensitivity adjustment and an LED status indicator.

1. Retro-reflective type photoeyes are to be used for applications where the distance between the photoeye and the reflector is less than 10'.
2. Photoeye applications that require a scan distance of 10' or greater are to use a separate transmitter and receiver, (rather than the single retro-reflective photoeye).

d) The BHS contractor shall provide AC photoeyes with quick disconnect cables (for ease of replacement). The cable shall be UL recognized, 18 AWG (minimum), and one piece molded design.

e) The BHS contractor shall mount the photoeyes to structural members or side guards, using an adjustable mounting bracket (supplied by the photoeye manufacturer).

1. The photoeyes are to be mounted in a vertical, (not horizontal), attitude. The alignment and status LEDs shall be easily visible (for maintenance personnel).
2. All photoeyes and cabling shall be firmly attached and protected from the associated equipment, personnel impact, maintenance personnel servicing the equipment, or personnel working in the area.

f) Photoeye mounting brackets are to be directly attached to the associated conveyor structure. The use of shims between the conveyor structure and the photoeye mountings is not acceptable. No reflector bracket mounting penetrations through the side guards shall be acceptable. Mount photoeyes using hex head 1/4" - 20 bolts (of appropriate length), and related 1/4" - 20 hardware (flat washers, lock washers and nuts).

g) Reflectors shall be mounted to conveyor side guards using brackets that provide both vertical and rotational adjustment. No reflector bracket mounting penetrations through the side guards shall be acceptable. Mount reflector bracket using hex head 1/4" - 20 bolts (of appropriate length), and related 1/4" - 20 hardware (flat washers, lock washers and nuts). Use lock or start washer on reflector stud.

h) When holes through conveyor side guards are required, the holes shall be a maximum of 1.5" in diameter and located so that the center of the photoeye beam is 2.5" above the conveyor belt. The holes in the conveyor side guards shall be dimpled away from the baggage flow to minimize the possibility of snagging a bag and causing a jam. Oblong openings in the conveyor side guards are not acceptable.

i) Only one side guard opening per photoeye and one side guard opening per related reflector shall be acceptable. Any unused photoeye/reflector openings in the side guards shall be properly filled (with a welded circular blank), ground smooth and properly painted.

j) Photoeyes shall be mounted on the side of a conveyor having the lesser chance of contact (by operational or maintenance personnel. The photoeyes are to be located on the catwalk side of conveyors to ensure maintenance access. Install guards to protect photoeyes (if susceptible to personnel contact).

k) The BHS contractor shall supply cord sets (of an appropriate length) to connect the photoeyes, so that there is no more than 12” of excess cable length remaining.

1. The excess cable shall be coiled and secured to the associated conveyor with the use of appropriate cable mounting clips.
2. The BHS contractor shall not use plastic cable ties to secure the cord sets.

2.6.15 Visual & Audible Warning Devices

a) The BHS contractor shall provide low profile, UL listed, polycarbonate industrial rotating or flashing beacons for start/fault/estop warnings at MCPs and claim devices. These devices shall be 120 VAC, Edwards 51 series beacons with horn (or approved equivalent).

b) Warning devices to be used in public areas shall be coordinated and approved by the owner.

c) The BHS contractor shall provide Mallory-Sonalert 30 mm Piezoelectric (or approved equivalent) audible start warning at the load belt conveyors (public and non-public). The load belt audible start warning devices shall be 120 volts AC and shall be rated at 55 to 60 dB at 2ft.

d) Allen Bradley 855 stack lights shall be used for remote locations for start/fault and estop visual and audible warnings.

2.6.16 Motor Starters

a) Motor starters shall be NEMA Rated, (if Project required) 3-Pole, 480V, with 120 Starter Coil Voltage, magnetic across-the-line contactors, each with a holding contact and auxiliary contacts.

1. The auxiliary contact shall provide an input to the PLC (120 VAC).
2. Motor starters shall each have three manual-reset, thermal-overload relays.

3. Starters shall incorporate thermal overload protection in all phases.
4. The BHS minimum motor starter size shall be NEMA size “0”

b) NOTE: Equivalent IEC motor starters are acceptable when using corresponding Motor Protector Switches (MPS’s)

2.6.17 Variable Frequency Device (VFD)

a) The BHS contractor shall provide programmable Variable Frequency Devices (VFDs) to control the operation of three phase induction AC motors for merges, queues and all other conveyors that require bag tracking at a minimum, unless otherwise stated in the contract drawings motor list.

1. All VFDs shall be configured to be controlled and programmed via the PLC.
2. Dynamic braking shall be provided for all the conveyors within the BHS bag tracking zones. Provide dynamic braking resistors where required for faster stopping.
3. Provide an electric brake, wired separately from the VFD power source, for decline conveyors, that bags are being tracked on, (to prevent conveyor coasting).
4. VFD controlled incline conveyors, that bags are being tracked on, shall have provisions on the associated gear box (to prevent conveyor coasting).

b) VFDs shall be typically installed within the associated Motor Control Panels (MCPs).

1. All VFDs utilized by the BHS shall be UL listed and IEC compliant.
2. Provide a local keypad control for start, stop, and speed reference. Provide the ability to program and monitor all drive parameters. Provide programming devices with pre-programmed parameters for various types of systems.
3. All VFD faults shall be enunciated and logged, regardless of whether or not they have been automatically reset.

c) VFDs shall be capable of performing the required engagement cycles per minute for the specific application (under full load conditions) with no objectionable heating, overload tripping or other VFD nuisance faults.

1. The BHS contractor shall factor this in and provide VFDs and dynamic braking resistors with a larger power rating (if required).
2. The BHS contractor shall factor in heat dissipation when designing the MCPs. If excessive heat is anticipated from the braking resistors, then mount the resistors in a separate NEMA 12 enclosure (for interior equipment).
3. If the control transformer that is powering the associated MCP is greater than 10 times the drive rating, provide an input line reactor for each AC drive.

d) VFD rated shielded cable shall be installed when VFD’s are used.

1. The type of cable shall be Belden, O'Flex or approved equivalent.
2. The shield shall be connected to both the motor and the PE (Potential Earth) ground on the AC drive.

3. For cable lengths of 50 ft. or more (between the VFD and motor), a minimum of one (1) additional amp needs to be added to the drive rating (to handle cable-charging current).
4. For cable lengths greater than 100 ft., a minimum of two (2) amps needs to be added to the drive rating (for cable charging current).

e) VFD enclosures (when used) shall allow maintenance personnel to see the status display (without opening the enclosure) through a transparent NEMA rated window at the front of the enclosure.

2.6.18 Control Transformers

a) The BHS contractor shall provide 480/120-volt, single phase, 60-Hz, (with minimum 20% spare capacity), dry type, core and coil type transformer, with terminal board and secondary fuse kit.

2.6.19 Control Relays

a) Control Relays shall have a 120-volt AC coil rating, and each relay shall have a minimum of four NO/NC contacts rated at 600 volts, 10 amps. Provide surge suppressors on control relay coils.

b) Interface Relays shall use a relay socket that shall accept both 120VAC and 24VDC relays (to allow flexibility for interface connections).

c) All timing functions shall be accomplished through the associated PLC programming. Pneumatic timing relays are not acceptable, unless required for a specific operation, or on small systems using relay logic. The use of “latching relays” is not acceptable.

2.6.20 Data Cabling

a) BHS Data Cables shall be installed in cable trays or conduit and shall not be attached to any BHS conveyors and/or associated equipment.

b) BHS Data Cables shall not be run in wire way or conduit with power cables.

2.7 BHS CONTROL SYSTEM DESIGN

2.7.1 General Design Requirements

a) This functional specification is intended to define the design and functional requirements of the control system. The definitive architecture and design is the responsibility of the BHS contractor and is subject to review and approval by the Owner (or OAR). The BHS design shall be a complete operational system as outlined or illustrated in the Contract Documents. The work shall be phased and completed in a manner that shall not adversely impact Airport operations.

b) The BHS contractor shall coordinate and provide any required interfaces to the BHS Computer System with the Owner (or OAR).

c) The Control System consists of new PLC control systems. All the BHS conveyors and subsystems are controlled by new PLC's and I/O chassis adhering to current BHS industry technology.

d) The BHS contractor shall clearly identify the concept on which this proposal is based and identify in detail the proposed control system architecture, the major components to be utilized and the concept employed for software development.

e) Submittal of the proposal shall acknowledge the functional intent of the control system specification. The design shall be the result of modifications and/or refinements established herein. These changes shall not be the basis for increased cost requests.

f) The BHS contractor shall complete and submit, for the Owner's (or OAR's) review and approval, a comprehensive and detailed functional specification. This description shall include full details of operational procedures and control system provisions associated with the BHS, including but not limited to the following:

1. Control system development and implementation master schedule
2. Schedule of system hardware employed (main elements)
3. Start-up/Shut-down procedures
4. Description of conveyor control logic outlined by subsystem
5. Audio/Visual indications
6. Control station layouts/functions/operations
7. Power supply requirements
8. BHS Computer operator interface routines
9. Proposed overall control system architecture diagram.

2.7.2 Controls Meetings

a) The BHS contractor shall make allowance in the proposal to attend a minimum of two (2) control system meetings.

1. The meetings shall be at the job site or the Owner's office to review the Control System Functional Specifications and Electrical Control System design.
2. The meetings shall review the following discussion items. Material to be reviewed at the meetings shall be supplied by the BHS contractor at least two (2) weeks prior to the meetings.
3. The control system meetings attendance shall include representatives from the BHS contractor, the EDS equipment provider (if required), and the Owner (or OAR).

b) BHS Design Review - Meeting No. 1

1. BHS Power Requirements, UPS requirements, MCP sizes
2. Computer and PLC System Architecture

I. BHS Computer Interface Requirements
II. Hardware Requirements

III. Software Requirements

3. Subsystem control functions. As a minimum review the following:

I. Start-up/Shut-down Procedures
II. Jam Detection and “Restart” Procedures
III. Cascade Stop Operation
IV. Emergency Stop and “Restart” Procedures
V. Audio/Visual indications and locations
VI. Fire/Security Doors
VII. Security Card Swipe and Keypad Interfaces
VIII. General Control Logic per Subsystem

4. Electrical System Drawing Review

c) BHS Design Review - Meeting No. 2

1. Updates to previous meeting
2. Interface Requirements

I. BHS/L3 3DX-6700
II. BHS/ATR
III. BHS/BMA

3. Maintenance Information System (MIS) Review

I. Reports to be developed as defined within this specification.
II. Reporting functions and requirements to be provided

4. Maintenance Diagnostics System (MDS) Review

I. Graphic screens and Interfaces
II. Problem Resolution

5. EDS Subsystems

I. Bag Hygiene Policy
II. Security feed system and EDS allocation
III. Directional input devices
IV. Positive bag tracking throughout CBIS
V. Bag ID assignment / interfacing / IATA
VI. BHS/EDS start-up/shutdown procedures
VII. EDS test mode
VIII. EDS insert mode
IX. EDS/Failsafe audio/visual indications and locations
X. Failsafe procedures
XI. CBRA operation
XII. Anti-gridlock logic and procedures
XIII. Fallback procedures
XIV. Oversized processing
XV. Out of gauge and re-insertion

d) BHS Design Review - Meeting No. 3

1. Updates to previous meeting
2. SSTP Review
3. Testing Sequence and Schedule
4. Maintenance Diagnostics System (MDS) – Revised/Updated
5. Electrical System Drawings Review
6. The Baggage Handling System Interfaces
7. Subsystem Control Elements
8. Outstanding Issues

2.7.3 High Level Network

a) The BHS high-level network is a critical component that comprises the information and application infrastructure. Therefore, it shall be designed to be fully resilient with high requirement for good network and information security.

b) Install the latest and best hardware, software and network concepts/designs that are available in the market at the time of design.

c) Local area networks (high level communications) shall be employed to provide data messaging between the BHS computers, workstations, BSDs and PLCs. Provide industrial network(s) to link together distinct remote stations.

d) Ensure that a single connection failure from any interface does not impede the In-Line CBIS and BHS operation.

e) The network security design shall address security at the port level, network equipment protection, network access protection through a combination of Virtual Private Network and Firewall, access to mission critical application and authentication mechanism used by mission critical applications. In addition, the use of IP addresses on the networks shall be well managed.

f) Protection against threat software is extremely crucial to ensure minimal disruptions. The contractor shall employ anti-virus and content checking protection for all entry and exit points on the network. These security protections shall be installed at every interface that links to the network and protect points of entry and exit for all LANs that host critical applications.

g) It is also mandatory for the network to be based on open standards that are established, as this will ensure that the network is always able to accommodate newer equipment with superior performance when available.

h) The network shall also be a fully resilient network and every measure shall be taken to ensure that the network availability is at its highest possible. In order to accomplish this provision of power protection, redundant switches, multiple routing of network cables inclusive of optical fiber, high availability network equipment and intelligent use of load balancing hardware shall be necessary. All network cables shall be run in conduit and accomplish redundancy via physically separate conduit paths.

i) All network cables should be clearly marked for easy connection tracing.

2.7.4 Low Level Network

a) The BHS conveyor control system shall be based on multiple Programmable Logic Controllers (PLCs) and interface modules (IO) allocated by area, interconnected to each other by a high speed industrial control network.

b) The network shall display a high degree of noise immunity and rejection from electromagnetic and radio frequency interference (EMI/RFI). The contractor shall provide proper shielded network cables as recommended by the interface module manufacturer. Repeaters must be provided as recommended by the manufacturer to maintain network communication speed and reliability.

c) The BHS Subcontractor shall provide a minimum of two (2) network lines for A-B ControlNet or approved equal for lower level controls, so that a failure of one will not stop the system. Distribute the PLC communication loading evenly on each ControlNet network, to ensure the system redundancy requirements.

d) All network cables shall be run in conduit and accomplish redundancy via physically separate conduit paths. All network cables should be clearly marked for easy connection tracing. At a minimum, shielded cable shall be used as the physical media to connect components of the network. Cable must be capable of normal use in high noise environments. NEMA and/or network component supplier approved cable taps, connectors, and adapters suitable for use in a bagroom environment must be used.

e) The lower level network (EthernetIP) shall be installed to link together and provide high-speed communications between distinct remote components of the outbound BHS. The network must be capable of provided 100% reliable data transfer from time critical field devices such as belt encoders as required to facilitate baggage tracking (PLC scan time less than 40 msec, for example). The network must be capable of operating in a hot backup PLC configuration without any degraded functionality.

f) A gateway bridge shall be supplied that provides a link between the high-level network (BHS computers) and the BHS low level control network (PLCs and all other networked components).

2.7.5 Cybersecurity Requirements

a) The BHS contractor shall employ the latest and most effective equipment, software, and design standards to preserve the security of the BHS networks. Comply with the cybersecurity outlined in PGDS v7 (section 16) at minimum.

b) The BHS contractor shall work closely and coordinate with the airport's IT representative concerning the design and procedural details of cybersecurity.

c) The CBIS and CBIS control system shall have appropriate cybersecurity measures to ensure the system:

1. Does not allow unauthorized access to any portion of the CBIS networks, controls systems or components.
2. Does not allow unauthorized access to data or unauthorized data extraction from the control system, inclusive of both SSI and non-SSI data.
3. Employs appropriate equipment and systems to isolate networks.
4. Has appropriate updates and patches applied throughout its lifecycle to ensure ongoing security.

d) User Accounts: Individual user accounts shall be employed and the use of generic or multi-user accounts shall be prohibited. User accounts shall be terminated within 24 hours for those no longer requiring access. User accounts shall be audited monthly to ensure only required accounts are active. These requirements shall apply to remote access users as well.

e) Incident Handling: The ILDT shall prepare an incident handling plan to deal with cybersecurity related attacks.

f) The following cybersecurity specific submittals shall be prepared by the Project Sponsor during the construction phase and be submitted to TSA:

1. Cybersecurity plan. The plan shall be specific to the CBIS and shall include the following sections, w here applicable (not all sections apply to all systems, e.g. not all systems have remote access capabilities):

   - System architecture drawings.
   - User and account management controls.
   - Remote access policy and procedures.
   - Access log retention policy and procedures.
   - External network connections and access controls.
   - Disaster recovery plans and procedures.
2. Incident handling plan (as described above).
3. At TSA's request, cybersecurity measures shall be demonstrated to TSA.

g) Firewalls: Network firewalls to control the flow of network traffic shall be employed. The firewalls shall restrict connectivity to and from internal and external networks to those with a need-to-know

h) Remote Access: At a minimum, the system shall be secured as noted in Configuring and Managing Remote Access for Industrial Control Systems, April 2011, Centre for the Protection of National Infrastructure, and the United States Department of Homeland Security. Remote access activities shall be logged and review ed to ensure all access is by authorized personnel. At TSA's request, access logs shall be submitted to TSA within seven calendar days. Remote access shall be enabled only when required.

i) Software Maintenance and Updates: Appropriate software maintenance and patch management programs shall be employed to maintain the system security.

j) Network Segregation: The following networks shall be segregated, or "air-gapped" from all other networks: EDS image networks. Neither the BHS nor any other airport network shall be connected to the network used by the EDS for transmission of images e.g. the Morpho MUX or L3 NEDS. TSA data network. Neither the BHS nor any other airport network shall be connected to the TSA data network unless specifically directed and authorized by TSA. Wireless networks, should they be a part of the CBIS or its control system, shall adhere to the guidelines as noted in NIST Special Publication SP 800-153 Feb 2012 *Guidelines for Securing Wireless Local Area Networks (WLANs)*.

2.7.6 PLCs

a) All of the outbound conveyor subsystems shall be controlled by programmable logic controllers (PLCs) with Hot Back-up for redundancy purposes and shall be located in the MCPs.

b) The BHS conveyor control system shall be based on multiple Programmable Logic Controllers (PLCs) interconnected to each other by the BHS low-level data communication network. The PLCs and respective IO chassis will be divided as follows:

1. PLC1: MCP1, MPC7
2. PLC2: MCP2, MCP3, MCP4
3. PLC3: MCP5, MCP6
4. PLC5: MCP8
5. PLC6: MCP9

c) The BHS Integrator shall be responsible for the PLC and IO allocations and design, providing a fully functional control system that adheres to the requirements of this specification and the PGDS.

d) The contractor shall provide a new redundant Hot Back-up PLC system design with remote I/O for direct interface to all remote devices in the baggage handling system. The primary function of the Programmable Logic Controllers (PLC's) shall be the control the BHS system and support Upper Level System functions. The control PLCs will interface with the following types of equipment:

1. BHS field devices such as but not limited to motors, sensors, scanners, and encoders.
2. MDS computers and BSDs.
3. Building security and fire systems
4. EDS machines.

e) All PLC's interface modules and I/O cards shall be located in MCP cabinets as specified herein. Commonality of PLC manufacturers shall be maintained utilizing the minimum number of individual models.

f) The BHS PLCs shall be Allen Bradley ControLogix using the most current version available at time of product data submission.

g) The PLC system shall be provided with a minimum of:

1. 120 volt AC power supply
2. 120 volt I/O modules
3. EEPROM module
4. 25% spare memory
5. Minimum of 25% spare I/O capacity
6. Remote I/O communications capability

h) Provide PLC system with Ethernet capability for connection to external devices.

i) Input/output (I/O) modules shall have a visual indication of the status of each I/O point. The status displayed shall be for both signals input into each I/O module and the output signal from each I/O module

j) All PLC's shall employ an internal battery back-up system capable of storing data for a minimum period of 15 minutes, should a power outage occur.

k) Provide a fully annotated software copy of the up-to-date PLC software and program at the time of testing.

2.7.7 Responsibility for Programming

a) The BHS contractor shall modify and/or upgrade the PLC programs for the Baggage Handling System PLC's for all functions associated with the Project.

b) Coordinate the control system interfaces between the BHS and any other required associated system.

c) Program all monitoring system functions, associated with the BHS Project. These functions shall include the provision of audible and visual system alarms at the Control Room.

d) Programming techniques, data structures, and documentation shall be acceptable to, and approved by, the Owner (or OAR). The system software shall be written using as much non-proprietary software as possible.

e) The BHS contractor shall supply the Owner with the as-built programming documentation for the PLC's as follows:

1. Two complete (duplicate) CD, DVD or other approved media covering all applicable computer, PLC and system monitoring programming documentation, and two complete (duplicate) sets of hard copy documentation.
2. A copy of the pre-assembled Software for the BHS computer systems and the BHS PLC control system, (including all PLC ladder logic) shall be provided in software versions.

2.8 BHS FUNCTIONAL REQUIREMENTS

2.8.1 General Requirements

a) The Contract Drawings show the power distribution and locations of the associated MCPs.

b) The BHS contractor shall provide the design and installation of all control systems, integration software, and programming (in accordance with the sequence of operations) for the BHS, as described in the contract documents in addition to the normal BHS logic and controls. The TSA – “PGDS” requirements, (latest version) shall be used as a guide.

c) The BHS contractor shall provide “dry contacts” to interface with the Security Access Control System (SACS). When activated, the associated control station Start pushbuttons shall be enabled.

d) The BHS contractor shall provide “dry contacts” to interface with the building fire alarm system. If activated, the associated conveyors shall shut down and the corresponding fire/security doors shall close.

2.8.2 Pre-Start Conditions

a) The BHS MCP and/or associated PLC cabinet main disconnects shall be in the “ON” position.

b) No E-Stops are depressed in the associated zone.

c) No E-Stop Resets are required in the associated zone

d) No motor overloads, motor protector switches, or disconnects are tripped (or in “off” position) in the associated zone. Start-up is not inhibited by conveyor disconnects for devices having multiple drives like slope plates.

e) No BHS motor safety disconnects are in the “OFF” position in the associated zone.

f) No jams are present in the associated zone.

g) No oversize or out-of-gauge conditions are present in the associated zone.

h) No building fire alarm signal is detected within the associated zone.

i) No heat/smoke detector is activated within the associated zone.

j) The System Enable keyswitch on the associated MCP shall be turned “On”.

k) If required, the Security Access Card Reader (SACR) and Keypad (provided by Owner’s security contractor) shall be enabled at the associated BHS load belt conveyor.

l) The Control Room and/or load belt keyswitch is in the “Enable” position (where applicable).

2.8.3 Start Up Procedure

a) Prior to starting any BHS conveyors, all the applicable pre-start conditions shall be met.

b) The normal system start is accomplished by enabling the start pushbuttons at the associated load belt conveyor by activating the Card Reader and the corresponding Keypad.

c) After accessing the Card Reader and the Keypad, depressing the Start pushbutton at the associated load belt control station activates the start warning alarms and opens the associated fire/security doors.

d) When the start warning alarms expire (after a time delay) and the associated fire/security doors are fully open, the corresponding conveyor system shall start, beginning with the furthermost downstream conveyor.

2.8.4 Start Warning Alarm Sequence

a) The BHS contractor shall provide rotating beacons and audible horns as start warnings alarms in the areas specified.

b) The BHS contractor shall provide start warning alarms which shall activate on initial start-up, or by depressing a restart pushbutton to reset/restart the stopped conveyors, after a system fault (jam reset, E-stop reset, etc.)

c) Depressing a start pushbutton at the load belt conveyor (after access is acquired) shall signal the associated fire/security doors shall raise.

d) The start warning alarms shall activate for a predetermined amount of time (typically 8 seconds). After the start warning alarm expires and no faults are detected in the system, the associated conveyor system shall start, including the respective makeup or claim devices (if applicable).

e) The BHS load belt conveyors shall not start until the associated fire/security doors are fully open.

2.8.5 Fault Beacons / Audible Alarms

a) Beacons and audible alarms for start-up, fault conditions and emergency stops will be activated at the MCP and remote locations that are isolated audibly and visibly from the MCP. Coordinate location of remote stack light alarms with the owner to best provide for safety and maintenance response.

b) The BHS contractor shall provide fault beacons and fault alarms for the following at a minimum:

1. Photoeye Jams
2. Oversize or Out-of-Gauge bag detected
3. Overload or MPS tripped
4. Motor Safety Disconnect off
5. E-Stop activated

6. Failsafe detected

c) When a fault is detected, the amber alarm beacon shall activate and the audible alarm shall sound. The duration of the audible alarm shall be predetermined. The illuminated amber fault beacon shall remain activated until the affected fault has been cleared and reset.

d) The illuminated red E-Stop beacon shall remain activated until the affected E-Stop has been cleared and reset.

e) The audible fault alarm shall have a unique sound that is different from the normal start warning alarms. The fault alarm may be silenced (but not cleared) via the “Alarm Silence” pushbutton at the associated MCP.

f) Whenever a BHS fault is detected, the fault alarm at the associated MCP shall activate and a corresponding indicator light shall be illuminated as follows:

1. Jam or other fault – Amber
2. Motor Overload – Blue
3. Emergency Stop – Red

g) Remote mounted indicators and warnings shall be installed the design drawings.

1. Oversize or Out-of-Gauge – White Illuminated Button (local control Station)
2. Failsafe detected – Blue Stack Light (near failsafe detection PEs)
3. Screening Status – Green (clear), Red (Alarmed), White (Unknown) Stack Light installed at decision point of an EDS machine.

2.8.6 Typical Control Stations

a) Start/Stop Control Stations shall be located on a stanchion or wall mounted load belt conveyors. Typically located at ticket counter, curbside and inbound claim feed load belts. These control stations shall include the following control devices:

1. Start: Illuminated Green Pushbutton
2. Stop: Non-illuminated Red Pushbutton
3. Oversized: Illuminated White Indicator
4. Fault: Illuminated Amber Indicator
5. Start Alarm: Audible Warning Buzzer
6. E-Stop: Illuminated Red, Lockable, Push-Pull

b) Control stations shall be installed adjacent to each associated fire/security door, (on the secure side) which shall contain the following control devices:

1. Maintenance/Auto: Key Switch
2. Door Open: Non-illuminated Black Pushbutton
3. Door Close: Non-illuminated Black Pushbutton
4. Re-Start: Illuminated Green Pushbutton
5. E-Stop: Illuminated Red, Lockable, Push-Pull

c) The control stations provided at Jam Reset/Restart locations shall include the following control devices:

1. Jam: Illuminated Amber Indicator Light
2. Re-Start: Illuminated Green Pushbutton
3. E-Stop: Illuminated Red, Lockable, Push-Pull

d) Operator control stations provided at Claim and Makeup devices shall include the following control devices:

1. Re-Start: Illuminated Green Pushbutton
2. E-Stop: Illuminated Red, Lockable, Push-Pull

e) Operator control stations provided at Ticket Counter intermediate positions and at BSDs in CBRA shall include the following control devices:

1. E-Stop: Illuminated Red, Lockable, Push-Pull (reset from other nearby control stations at ticketing, or a supervisory reset station in CBRA)

f) Maintenance control stations provided near the drive units of a Claim or Makeup device shall include the following control devices:

1. Auto/Maint.: Two (2) Position Keyswitch
2. Jog: Momentary Contact Pushbutton
3. Re-Start: Illuminated Green Pushbutton
4. E-Stop: Illuminated Red, Lockable, Push-Pull

g) EDS entrance, Operational Test Kit processing (OTK) control stations provided just upstream of an EDS machine shall include the following control devices:

1. Auto/Test: Two (2) Position Selector Switch
2. Insert Test Bag: Illuminated Blue Pushbutton
3. Out of Gauge: Illuminated White Pushbutton
4. Jam: Illuminated Amber Indicator Light
5. Re-Start: Illuminated Green Pushbutton
6. E-Stop: Illuminated Red, Lockable, Push-Pull

h) EDS exit, image quality control stations provided just downstream of an EDS machine shall include the following control devices:

1. Test Bag Reset: Illuminated Blue Pushbutton
2. Jam: Illuminated Amber Indicator Light
3. Re-Start: Illuminated Green Pushbutton
4. E-Stop: Illuminated Red, Lockable, Push-Pull

i) Oversized Bag Inspection control stations provided at the OS load unload station shall include the following control devices:

1. Advance: Green Pushbutton (starts the load and downstream conveyors)

j) CBRA Insert and Oversized Insert control stations provided at the oversize and reinsertion line shall include the following control devices:

1. Insert: Black Pushbutton (prevents load and upstream bags from advancing)
2. Dispatch: Green Pushbutton (restarts the manual insertion and downstream conveyors)

k) Oversized Bag Inspection control stations provided at the OS load unload station shall include the following control devices:

1. Advance: Green Pushbutton (starts the load and downstream conveyors)

l) Bag Inspection control stations provided at the BIS locations shall include the following control devices:

1. E-Stop: Illuminated Red, Lockable, Push-Pull

m) The control stations provided at the MCPs shall include the following control devices:

1. System Enable: Two-position Keyswitch
2. System Start: Illuminated Green Pushbutton
3. Fault Reset: Illuminated Blue Pushbutton
4. Lamp/Alarm Test: Non-illuminated Gray Pushbutton
5. Alarm Silence: Non-illuminated Yellow Pushbutton
6. Emergency Stop: Illuminated Red Pushbutton

2.8.7 Diverters

a) To facilitate maintenance, a lockable disconnect switch shall be provided for each diverter motor. A lockable disconnect switch shall also be provided for each electric HSD unit. A mode selector switch shall be provided to operate the diverter in the maintenance mode.

b) Provide integrated, hard wire, Estop functionality between the local conveyor control station(s) and the diverter unit for safety.

c) For safety, the diverter's sensing controls and diverter drive mechanism shall be disarmed whenever the mainline has stopped for any reason.

d) High speed paddle diverters shall have the following control devices located on the control panel of the diverter at a minimum:

1. Disconnect: Two (2) Position Lockable Switch
2. Ready: Green Pilot Light
3. Fault Reset: Illuminated Amber Pushbutton
4. Service/Man/Auto Mode Switch: Three (3) Position Switch
5. Ret/0/Ext Paddle Position: Three (3) Position Switch
6. Stop/Jog Paddle Belt Control: Two (2) Position Switch
7. Ret/0/Ext Teach Positioning: Three (3) Position Switch

e) Vertical sorters shall have the following control devices located on the control panel of the sorter at a minimum:

1. Disconnect: Two (2) Position Lockable Switch

2. Ready: Green Pilot Light
3. Fault Reset: Illuminated Amber Pushbutton
4. Teach/Auto/Manual Mode Switch: Three (3) Position Switch
5. Normal/Bypass Guard: Two (2) Position Key Switch
6. Jog Up: Black Pushbutton
7. Jog Down: Black Pushbutton
8. VSU Lowered: White Pilot Light
9. VSU Raised: White Pilot Light
10. Cycle VSU: Black Pushbutton

f) The devices and functionality shown above shall be provided on the OEM control enclosure or in a BHS integrator provided enclosure.

g) Provide integration with the diverter/sorter with regard to MDS/MIS statuses and events. At a minimum provide the following statuses:

1. Out of Auto
2. Ready
3. Extended /Raised (graphical)
4. Retracted/Lowered (graphical)
5. Faulted
6. Disconnect Off (or Overload)

2.8.8 Fire/Security Doors

a) The BHS contractor shall provide a door obstruction photoeye to detect bags under the associated fire/security doors. This photoeye may also be used for autostop and/or overlength detection.

b) The BHS contractor shall provide an externally mounted photoeye, so that the "fully open" position of the door is detected. If the door is sensed to not be in the fully open position, the associated conveyor shall be stopped (if it is running) or shall not be permitted to start if the conveyor is not already running.

c) The BHS contractor shall provide an externally mounted photoeye, so that the "fully closed" position of the door is sensed. If the door is sensed to not be in the fully closed position, an indication shall be sent to the system fault monitoring system.

d) PLC I/O or PLC network interfaced obstruction, open, closed photoeyes that are provided by the door manufacturer will be acceptable. Door manufacturer provided photoeyes must adhere to the requirements of this spec.

e) The BHS contractor shall provide Interface connections and test the fire/security doors interfaces with the building fire/security system for the doors status.

f) The BHS contractor shall program the fire/security doors to operate as follows:

2.8.8.1 Start Functions:

a) Fire/Security doors located at load belt inputs and curbside load areas shall require a Security Access Card Reader (SACR) permissive signal and Keypad activation to enable the corresponding Start pushbutton.

b) After depressing the respective Start pushbutton, and while the start warning alarms are being activated, the associated fire/security doors shall open.

c) The BHS PLC shall send the doors status to the Building Security System.

d) This condition shall be indicated on the MDS.

2.8.8.2 Stop Functions:

a) After depressing the Stop pushbutton at the load belt control station, the associated load belt conveyors shall run for a sufficient time to ensure all the bags have been transported past the associated doors.

b) The load belt conveyors shall stop and the fire/security door shall close.

c) The BHS PLC shall send the door status to the Building Security System.

d) This condition shall be indicated on the MDS.

e) If the door clear photoeye detects a bag under the associated door, the conveyors continue to run until the photoeye is clear, and then close the door.

2.8.8.3 Fire Detection:

a) The BHS provided “dry contact” closes and gives an input signal to the PLC to shut down the associated system.

b) If no bag is detected under the door (by the door clear photoeye), all the associated conveyors shall stop and the door shall close.

c) If a bag is detected under the door (by the door clear photoeye), the conveyors continue to run until the photoeye is clear, and immediately stop the upstream and downstream conveyors.

d) If the door is unable to close upon detection of a fire signal or system stop signal, a fault alarm shall be activated at the associated MCP.

e) This condition shall be indicated on the MDS.

2.8.8.4 Fire/Security Door Control Station:

a) A fire/security door control station shall be installed adjacent to each fire/security door for maintenance personnel use only (not accessible from the public side).

b) When the Maintenance/Auto keyswitch is in the Maintenance position, the “door open” and “door close” pushbuttons are enabled.

1. Associated conveyor systems are not active when the Maintenance Mode is activated.
2. Activation of the load belt Security Access Card Reader is not required to enable the Maintenance Mode.

c) All the powered fire/security doors shall be equipped with a Manual Release Mechanism (to permit the disengagement of the door drive unit) so that the door can be either raised or lowered manually via pull chain.

2.8.9 Photoeye Functions

a) Photoeyes shall be provided to perform the required control system sensor functions. The BHS contractor shall combine photoeye functions (for efficiency), provided that all proper control functions are maintained.

2.8.9.1 AutoStart

a) The BHS contractor shall provide autostart photoeyes upstream of sections of transport conveyors not specifically controlled by start/stop switches. The same photoeye may be utilized to control both the autostart and autostop circuits. The autostart circuits shall be programmed to start a string of conveyors whenever an autostart photoeye is blocked.

b) Before starting any BHS conveyors, audible start up warning alarms shall be actuated in the area affected. Activation of the start warning alarms shall be through the PLCs. The start warning alarms shall sound for a predetermined time period and then the associated conveyor subsystem shall start.

c) Each conveyor in the subsystem shall be started in reverse sequential order starting from the last downstream conveyor to the first upstream load conveyor, with a short delay between each motor starter actuation. This condition shall be indicated on the MDS.

2.8.9.2 AutoStop (Time-Out)

a) Autostop photoeyes shall be provided upstream of sections of transport conveyors not specifically controlled by start/stop switches. The same photoeye may control both the autostart and the autostop circuits. If a BHS conveyor stops for any reason, the autostop timer shall reset and hold until the conveyor restarts.

b) The autostop circuits shall be programmed to stop a string of conveyors. If the auto stop photoeye does not detect a bag for a certain time period (adjustable in the PLC). This condition shall be indicated on the MDS.

2.8.9.3 Overheight Detection

a) The BHS contractor shall provide Overheight detection photoeyes at every outbound BHS input (ticket counter and curbside) and inbound belt feed conveyors to detect bags that are too high to clear the lowest downstream

obstruction. The overheight detection photoeye shall be set at 36" above the top of the conveyor belt, (unless otherwise stated).

b) Provide an overheight indicator lamp in the associated control station, (this lamp may be the same unit as that for overlength detection).

1. When the conveyor is running and the overheight detection photoeye is blocked by a bag, the associated conveyors shall stop.
2. The oversize indicator lamp shall illuminate in the associated control station. A fault condition will be indicated at the MCP.
3. This condition shall be indicated on the MDS.

c) Resetting the overheight condition requires the following sequence:

1. Actuate the associated E-stop pushbutton in the adjacent control station
2. Remove the bag that is blocking the photoeye. The oversize indicator lamp shall flash.
3. Press the start/restart pushbutton in the adjacent control station. The stopped conveyors shall restart (after start warning). The oversize indicator lamp shall extinguish

2.8.9.4 Overlength Detection

a) The BHS contractor shall provide Overlength detection photoeyes at every outbound BHS input (ticket counter and curbside) to detect bags that are too long.

b) Provide an oversize indicator lamp in the adjacent control station. (This lamp may be the same unit as that for overheight detection).

1. The overlength measurement shall be programmed to stop the associated conveyors if a preset bag length (adjustable in the PLC) is exceeded.
2. The oversize indicator lamp shall illuminate in the control station. A fault condition will be indicated at the MCP.
3. This condition shall be indicated on the MDS.

c) Resetting the overlength circuit requires the following sequence:

1. Actuate the associated E-Stop pushbutton in the adjacent control station.
2. Remove the bag blocking the overlength detection photoeye. The oversize indicator lamp shall flash.
3. Press the start/restart pushbutton at the adjacent control station. The stopped conveyors shall restart (after start warning). The oversize indicator lamp shall extinguish

2.8.9.5 EDS Overheight/Overlength

a) Per PGDS v7, bags having no dimension information after the BMA shall be routed to the EDS. The BHS contractor shall provide Overheight and Overlength detection photoeyes (or light curtain) upstream of the EDS entrance to detect bags that are too high or long to be processed by the EDS machine.

b) Provide an indicator lamp in the associated OTK control station.

4. When the conveyor is running and an OOG item is detected, the associated conveyors shall stop.
5. The OOG indicator lamp shall illuminate in the associated control station. A fault condition will be indicated at the MCP.
6. This condition shall be indicated on the MDS.

c) Resetting the overheight condition requires the following sequence:

7. Actuate the associated E-stop pushbutton in the adjacent control station
8. Remove the bag that is blocking the photoeye. The oversize indicator lamp shall flash.
9. Press the start/restart pushbutton in the OTK control station. The stopped conveyors shall restart (after start warning). The oversize indicator lamp shall extinguish

2.8.9.6 Cascade Stop

a) Provide a head end (cascade stop) photoeye within 12" of the discharge ends of all straight conveyors and 6" on power turns and queue conveyors. The center of the photoeye beam is approximately 2.5" above the top of the conveyor belt.

b) When a downstream conveyor stops as a result of a fault condition, the conveyor immediately upstream of the stopped conveyor continues to run until the corresponding head end photoeye is blocked.

1. When this occurs, the associated conveyor shall stop. The preceding upstream conveyor shall run until its head end photoeye is blocked.
2. This cascade stop function shall continue through the upstream conveyors until the jam/failure is cleared or the first conveyor in the subsystem has stopped. This condition shall be indicated on the MDS.

c) The cascade stop logic shall initiate the associated load belt's Start pushbutton "Green light" to flash when the respective system or subsystem has cascade stopped (all the way upstream to the load belt).

d) Conveyors that cascade stop as a result of a jam, or other fault condition shall be "held stopped" through PLC logic until the jam or other fault condition is reset, and the conveyors have been restarted.

e) The head end (cascade stop) photoeye shall also be utilized for jam detection, but no control station shall be installed in conjunction with this photoeye. Upon the detection of a jam at this head end (cascade stop) photoeye, initiate the following steps:

1. Stop the corresponding conveyor with the cascade stop photoeye and the conveyor immediately downstream.
2. The fault alarm at the associated MCP shall be activated. The jam indicator light shall illuminate in the nearest associated jam reset/restart control station.
3. This condition shall be indicated on the MDS.

2.8.9.7 Jam Detection

a) Locate (head end) jam photoeyes to provide for operation of jam detection circuits within 12" of the discharge ends of all straight conveyors and 6" on power turns and queue conveyors. The center of the photoeye beam shall be 2.5" above the top of the conveyor belt.

b) Whenever a conveyor stops for any reason, the jam detection timer shall reset and hold until the conveyor restarts.

c) At a minimum, provide jam detection photoeyes and a Jam illuminated pilot light, an illuminated Restart, pushbutton, and an illuminated Emergency Stop push-pull switch (in a control station in areas that have a relatively high frequency of jams). These locations shall include:

1. The discharge ends of all conveyors feeding onto power turns,
2. At the bottom of declines and top of incline conveyors,
3. At all merges for both the primary and secondary lines,
4. Every other conveyor, on queue conveyors, and on long strings of conveyor lines.
5. Any other location where a potential jam point exists.

d) When the conveyor is running and the associated photoeye is blocked for longer than an adjustable timer, in the PLC, (6 seconds adjustable), a jam condition is detected. The following things shall occur:

1. The conveyor with the blocked jam detection photoeye and the conveyor immediately downstream shall stop.

   I. If the jam photoeye is located on a conveyor that feeds onto a power turn, the conveyor with the jam detection photoeye, the power turn and the conveyor immediately downstream of the power turn shall stop.
   II. If the jam photoeye is located on a merge conveyor the merge belt shall stop and the next conveyor downstream shall stop.

2. The fault alarm shall sound at the associated MCP. The jam indicator light in the nearest associated control station shall illuminate.

3. This condition shall be indicated on the MDS.
4. All conveyors upstream of the stopped conveyors shall cascade stop and be ‘latch stopped until the downstream conveyors restart.

2.8.10 Jam Indication and Restart

a) The BHS contractor shall provide an illuminated amber Jam pilot light (in a control station along with an E-Stop pushbutton and a green illuminated Restart pushbutton) adjacent to all jam detection photoeyes. The control station shall be painted OSHA #1016 or #1026 “Safety Yellow”.

1. The Jam light shall illuminate solid when the jam detection photoeye senses a jam condition. An audible fault alarm shall sound at the associated MCP.
2. This condition shall be indicated on the MDS.

b) To restart the stopped conveyors and extinguish the associated lights and alarms perform the following sequence:

1. Actuate (push in) the associated adjacent Emergency Stop pushbutton (the E-Stop indicator lamp shall illuminate flashing)
2. Remove the jammed bag and verify that the photoeye is clear.
3. The illuminated Jam light shall flash (indicating that the jam photoeye is clear and the stopped conveyor is ready to restart).
4. Reset (pull out) the associated Emergency Stop pushbutton (the E-Stop indicator lamp shall extinguish).
5. Depress the illuminated green Restart pushbutton (the light shall extinguish and the stopped conveyors shall restart after the start warning alarm sequence)

c) The BHS contractor shall paint the control station enclosures in non-public areas with OSHA #1016 or #1026 "Safety Yellow” paint and label with the conveyor Item Designations of the conveyors being controlled in 1/2" high block letters.

1. Jam detection control stations shall be placarded with the BHS conveyor designations that are being controlled.
2. Most of the control stations shall be located adjacent to the conveyors under control and accessible only to personnel clearing the jam.
3. Note: All such control stations shall be located on the catwalk side of conveyors that are equipped with catwalks.

2.8.11 Motor Overloads

a) The BHS contractor shall size the motor overload heaters based on the actual motor “nameplate rating”, (but shall not exceed 115% of the full load amps).

b) If any BHS conveyor motor draws excess current, appropriate protection shall be provided to isolate the supply to all the subsystem elements (VFD controlled belts shall perform this function within the VFD functionality).

1. A single "motor overload" indicator is provided on an MCP. This indicator shall illuminate when any motor overload trips in the subsystem being controlled.
2. This condition shall be indicated on the MDS.

c) After rectification of the cause of the motor overload to trip, and after manually resetting the overload heater element in the associated MCP, the system may be restarted by actuation of the MCP Restart pushbutton. The motor overload indicator shall be extinguished and normal control shall resume (after start warning).

d) In the event of an individual conveyor motor overload trip, all of the upstream conveyors shall revert to cascade stop mode, while all the downstream conveyors shall continue to run in the normal mode of operations.

2.8.12 Emergency Stop Pushbuttons

a) Provide Emergency Stop (E-Stop) pushbuttons to ensure that operating and maintenance personnel can easily and quickly reach an E-Stop pushbutton anywhere in the system.

b) Ensure that E-Stop pushbuttons are installed, at a minimum, in the following locations:

1. Around the perimeter of all makeup and claim devices.
2. At each end of load/unload conveyors.
3. Along lengths of conveyors, at a maximum of 50' apart.
4. In each jam indication control station.
5. In each maintenance control station

c) All Emergency Stop pushbuttons for a single subsystem shall be wired in series with the coils of one or more emergency stop relays.

1. Provide the normally open contacts of the relays (in series) to be the power source of the associated PLC output modules controlling the conveyors in the subsystem.
2. The BHS PLC shall not be required to remove power from the associated conveyors for an emergency stop condition.

d) When developing E-Stop zones, the BHS contractor shall take into consideration the following

1. Consideration shall be given to the MCP breaks. If the downstream MCP is shut down, upstream bags that are left in the system shall be able to divert (or be manually removed) prior to the equipment that is inoperable.
2. The 45-degree merge E-Stops shall be tied into the receiving (take-away) conveyor.
3. The activation of an E-Stop pushbutton shall not close any powered fire/security door within the same zone of the E-Stop pushbutton.

e) When an Emergency Stop pushbutton is actuated, the following shall occur:

1. The associated conveyors in the subsystem shall stop,
2. The lamp in the head of the pushbutton shall illuminate flashing.
3. The other E-Stops in the same zone shall illuminate solid.
4. The red Emergency Stop fault beacon shall illuminate at the MCP.
5. This condition shall be indicated on the MDS.

f) To restart the stopped conveyors and extinguish the indicator lamp and MCP fault light, perform the following sequence.

1. Reset (pull out) the actuated E-Stop pushbutton.

   i. The associated E-Stop light shall shift from flashing to solid.
   ii. The other E-Stops in the same zone extinguish.

2. Depress the illuminated flashing green Restart pushbutton.

   i. The indicator lamp and MCP fault beacon extinguish.
   ii. The stopped conveyors restart, after start warning sequence.

g) When the conveyor control station Restart pushbutton is actuated, the start warning alarms are activated and, (after a delay), all of the associated stopped conveyors in the subsystem will start.

h) All E-Stop activations shall be reported both visually (beacon) and audibly (fault alarm bell) on the associated MCP.

i) This condition shall be indicated on the MDS.

2.8.13 Alarm Silence

a) An alarm silence (momentary contact) pushbutton shall be provided on the door of the associated MCP.

b) When this pushbutton is depressed, it shall silence the audible fault alarm. The control circuitry shall allow for multiple faults to always sound the associated fault warning alarm. Any additional faults occurring after the alarm has been silenced shall again cause the fault warning alarm to sound.

c) The illuminated fault indicators are not extinguished until the fault has been corrected.

2.8.14 Advance/Jog

a) The advance (bag advance) pushbutton function applies in situations where powered conveyors end at a non-powered conveyor, such as a roller conveyor, where operator reach or other ergonomic factor dictates the need. The corresponding conveyor will run while the pushbutton is being pressed and the conveyor is enabled (not faulted or estopped).

b) The jog pushbutton is typically used for maintenance functions for a flat plate or slope plate conveyor. The corresponding conveyor will run while the pushbutton

is being pressed and the conveyor is enabled (not faulted or estopped) and in maintenance mode.

2.8.15 Hand-Off-Auto (HOA)

a) An HOA is a three position selector switch implemented for each drive with the following functions:

1. (H) In the “Hand” position, the conveyor will run regardless of a jam condition, or conditions of surrounding conveyors. This will not in any way override an Estop since these are hard wired.
2. (O) In the “Off” position, the conveyor will stop and be prevented from running even if conditions allow otherwise.
3. (A) In the “Auto”, the conveyor will be placed under the normal automatic control of the PLC.

b) HOAs can be implemented as a hard wired control station located near the drive, or as soft control implemented at the HMI. When implemented as a soft control, this function shall only be usable in conjunction with a “Maintenance” user login or supervisor with a proper warning and 2 step initiation. Coordinate with the owner for HOA requirements.

3 PART 3 - EXECUTION

3.1 BHS FABRICATION

a) Fabricate equipment using steel that is clean and free from rust, rust pits, kinks and sharp bends. Use forming methods that shall not fracture or otherwise damage the metal.

b) Remove burrs, sharp edges, and sharp corners. Smooth all joints and round all corners. Align joints in components to ensure smooth conveyance of baggage.

c) When two sections of conveyor bed meet, these joints shall be chamfered to ensure that there is no step-up condition between bed sections.

d) Holes in metal side guards for photoeyes and reflectors are to be "punched", not burned, and tapered from the inside (wide) to the outside (narrow).

3.2 BHS MATERIAL REQUIREMENTS

a) Hot-rolled sheets and coils shall conform to ASTM A-569.

b) Structural steel plates shall conform to ASTM A-36.

c) All welding electrodes shall conform to AWS A-5.1.

d) The standard AWS Code for Arc and Gas Welding in Building Construction shall be used as a guide for general procedures, and qualification of welders.

e) All BHS fasteners shall conform to ASTM A-325 (Class 2A thread fit for bolts, and Class 2B thread fit for nuts).

f) All fasteners shall be zinc-plated or approved equal. All fasteners shall be locked with locknuts, or lock washers.

g) Stainless steel fasteners shall be provided for stainless steel components, and galvanized fasteners for exterior components.

h) Steel that is used in the fabrication of the BHS equipment shall be free from rust, rust pits, kinks, burrs, and sharp bends.

i) The forming of material shall be accomplished by methods that shall not fracture or otherwise damage the metal.

j) All parts shall be formed and cut properly to assure uniformity. All burrs, sharp edges, and sharp corners shall be removed. All joints shall be smooth and all corners rounded.

3.3 BHS MECHANICAL INSTALLATION

3.3.1 General

a) The BHS contractor shall comply with all OSHA standards for conveyor installation, catwalk and platform installation, and safety and health regulations for construction, along with all applicable local safety and construction guidelines.

b) Complete all work during Airport's specified working hours in order to not interrupt, disrupt, or inconvenience any Airport operations and/or Airline passengers. It is the BHS contractor's responsibility to verify all the existing field conditions, (prior to bidding this work).

c) The BHS contractor shall reinstall any Airline, TSA or Airport owned equipment that may have been temporarily relocated and/or removed during the installation of the new baggage handling systems. This includes, (but is not limited to), such items as desks, work benches, lockers, planning sheet stands, load sheet stands, writing tablet stands, and any other equipment that was present prior to the installation of the new equipment.

d) The BHS contractor shall install the conveyor equipment true and properly aligned, complete in all details, in accordance with the specifications and manufacturers' recommendations, and as indicated on the corresponding drawings.

e) All joints shall be finished smooth and be free of snags and protrusions which could damage baggage, catch bags, or cause the system to jam. All BHS rollers and greaseable bearings shall be easily accessible for removal and/or replacement. Assemble all BHS equipment in such a manner as to facilitate routine maintenance.

f) Prior to startup of the BHS, polish and buff the bed surfaces smooth and free of sharp edges, dirt, paint, grease, etc.

g) All BHS stairways, catwalks, cross-overs, handrails, fences, guardrails, impact protection, bollards, working platforms, etc., shall be painted OSHA #1016 or #1026 "Safety Yellow".

h) The clearance above the baggage conveyor beds shall be thirty-six (36) inch minimum (unless otherwise approved on the drawings). The clearance between the conveyor bed frames and the adjacent walls or obstructions shall be one (1) foot minimum (or as approved on the drawings).

i) The maximum slope for all incline and decline conveyors shall be twenty-one (21) degrees, (not to exceed existing, unless otherwise approved on the drawings).

j) Uneven joints in conveyor side guards shall be epoxy filled and ground smooth (to eliminate all snag points), except in areas where stainless shrouding is installed. In these areas, the joints shall be tight without gaps, and smooth without field rework.

k) Provide welded connections for fabrication and installation of work, wherever bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance and replacement of worn parts.

3.3.2 Installation Tolerances

a) The BHS contractor shall ensure that gaps between end rollers do not exceed 1" (with ½" being the design objective).

b) Uneven joints to top of sideguard shall be equipped with a 45-degree transition to prevent bag jams from straps, etc.

c) The BHS contractor shall take special care during the installation to provide smooth, snag-free butt joints without the use of epoxy fillers. Apply epoxy on an exception basis only, when approved by the Owner (or OAR), in the case that a joint cannot be otherwise economically corrected.

d) The belt tension shall be tight enough to pull the full load capacity (without slipping). Do not "over-tighten" conveyor belts.

3.3.3 Hardware Installation

a) The BHS contractor shall provide all associated hardware which shall conform to ASTM A325, Type 1, or SAE Grade 5, Class 2A thread fit for bolts and Class 2B thread fit for nuts. All hardware shall be zinc-plated or equivalent (Stainless Steel in public areas).

b) All hardware shall be locked with locknuts or lock washers, with a minimum of three threads showing after the nut or double nut. All hardware shall be installed in a uniformed manner.

c) Submit all connection types for fabrication and installation of work wherever connections are required.

3.3.4 Welding

a) The BHS contractor shall provide welded connections for fabrication and installation of work wherever bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance and replacement of worn parts.

b) All welded surfaces shall be ground to create a smooth surface then thoroughly cleaned with a solvent to remove rust, scale, oil, grease, grit, and welding flash. The welded surface shall be primed with rust-preventive primer applied and painted with an alkyd paint to match the shop coat.

c) Comply with AWS standards for workmanship and for qualifications of welding technicians. "Weld Certifications" are required for all structural welds.

3.3.5 Floor Attachments

a) Floor attachments shall follow the installation designed as specified by the OEM in the installation drawings.

b) Floor attachments shall not interfere with egress systems. Floor attachments cannot block access to any equipment, devices, enclosures, etc.

3.3.6 Ceiling Attachments

a) Ceiling attachments shall be designed to avoid the transmission of excessive conveyor (periodic or transitory) loads into the structure. Provide spring or neoprene isolators for all connections.

b) Attachments to steel beams shall be clamped. Attachments to concrete slabs shall be with drilled expansion anchors, (sized for the load with adequate safety factors) and shall not exceed three (3) inches in depth.

c) Attachments to concrete beams shall be with drilled expansion anchors into the sides of beams only and placed a minimum of six (6) inches up from the bottom of the beam. All attachments shall be submitted for approval.

d) Replace fireproofing materials to an equal depth as the existing fireproofing at attachment locations. Fireproofing shall be of the same type and brand as existing.

e) All-thread hanger rods shall be continuous with no splices or couplings allowed. Note: An exception is allowed if all-thread length exceeds twelve (12) feet.

f) All-thread hanger rods shall be installed so as not to block access to the equipment. All-thread hanger rods shall be installed not to create vibration deterioration of the all-thread hanger rod, equipment or installed devices.

g) Header steel, steel beams and seals shall be installed so as not to block access to the equipment.

3.3.7 Gear Boxes, Reducers, and Drives

a) The BHS contractor shall install gear boxes and reducers on the conveyor drive shaft so that the compression ring is seated correctly, (to reduce the amount of wobble of the drive system).

b) Gear boxes and reducers shall be installed with a minimum of a ½” of the drive shaft protruding through the gear box or reducer, (to allow for the proper seating of the drive).

3.4 BHS ELECTRICAL INSTALLATION

3.4.1 General

a) All electrical components and materials shall conform to applicable standards of the National Electrical Manufacturers Association (NEMA). All components shall be designed for continuous duty service.

b) Applicable requirements of OSHA, ANSI Conveyor Safety Code B20.1, and the National Electrical Code (NFPA 70 - Latest Edition) shall be met, as well as those of any other governmental or local authorities having jurisdiction at the installation site.

c) All electrical components mounted to the BHS equipment that are to be removable shall be installed via cannon plugs or equivalent quick-disconnect method.

3.4.2 Power Distribution, Motor Distribution, Control Stations

a) The BHS contractor shall install electrical devices in accordance with the manufacturer's published instructions. Torque bus bar bolts to manufacturer's recommendations and tighten nuts and bolts on the steel enclosures to provide structural integrity. All terminal blocks and points shall be torqued to the manufacturer's recommended torque value.

b) Set overload relays at maximum values permitted by NEC 430-32 and 430-34, based on actual installed motor "nameplate full load amperes". Adjust the magnetic settings on motor circuit protectors in accordance with motor inrush currents and NEC requirements.

c) All open I/O ports shall be covered to prevent debris entering the ports. Enclosures shall be clean of all metal shavings, trash, and debris.

d) All surfaces to be painted shall be thoroughly cleaned of rust, scale, oil, grease, grit, welding flash, and all other forms of dirt detrimental to good painting practices. All bare metal surfaces shall be primed after cleaning. After installation, all scuffed or otherwise marred surfaces are to be cleaned and a touch-up coating of alkyd paint or rust-preventive primer applied to match the shop coat.

3.4.3 Field Devices

a) Equipment related materials shall be powder coated or painted with the Owner's (or OAR's) approved color in a uniformed color or to match existing field devices as specified by the Owner (or OAR).

b) All excess power cable, network cable etc. are to be neatly rolled and placed inside the device J-box when possible. In other cases the excess cord shall be neatly rolled and strapped to the backside of the conveyor leg.

c) Each device shall be identified by a unique number in a minimum of 1/8" font character using contrasting colors (black letters on white name plates). The name plate shall indicate the device type and the conveyor ID. When multiple devices of similar nature are located on the same equipment a unique identifier shall follow each device.

d) All field devices shall be mounted for ease of maintenance. Where catwalk is installed, all field devices shall be mounted on the catwalk side of the equipment. All field devices shall be mounted as to prevent damage to the device. All field devices shall be mounted on the equipment for which the device controls. All field devices shall be installed in a manner not to block access to the equipment.

3.4.4 Pull Boxes, J-boxes, and Raceways

a) Pull Boxes, J-boxes, Raceways etc. mounted on equipment or equipment-related material in the field shall be permanently labeled or marked with the name of the controlling PDP, MCP and/or PLC enclosure, and shall be securely mounted to “Unistrut” with “zero” horizontal or vertical play.

b) All boxes shall be installed for ease of maintenance. Where catwalk is installed, all boxes shall be mounted on the catwalk side of the equipment. All boxes and raceways shall be installed as to not block access to the equipment.

c) Any boxes installed that can be considered a “Head Knocker” shall be padded and clearly identified with (yellow and black) caution tape.

3.4.5 Conduit/Liquid Tight Flexible Conduit

a) Conduits/liquid tight flexible conduits shall be securely mounted and supported within eighteen (18) inches of a connector or coupling.

b) All Conduit fittings shall be of the compression type.

c) Conduits/liquid tight flexible conduits shall follow the National Electrical Code (NFPA 70 Latest Edition) Chapter 9 (Percent of Cross Section of Conduit and Tubing Conductors).

d) Conduits/liquid tight flexible conduits mounted to equipment shall not block access to the equipment or devices. Conduits/liquid tight flexible conduits shall be installed to prevent rubbing or vibration deterioration against other structures. Conduit drops and raceways shall not interfere with the maintenance access of conveyors.

e) Conduit drops to ceiling supported equipment shall have a minimum of twenty-four (24) inches of liquid tight flexible conduit installed between the device and box to the conduit to prevent vibration deterioration of conduit. The conduit drops shall not be supported or secured to the ceiling supported equipment.

f) Liquid tight flexible conduit from MSD shall be no more than 36”.

3.5 BHS TESTING AND ACCEPTANCE

3.5.1 General Requirements

a) Test bags and test personnel shall be used for the BHS contractor’s pre-testing, and the acceptance testing performed for the Owner (or OAR).

b) The BHS contractor shall also provide any necessary test or measuring equipment required to demonstrate the characteristics and performance of the equipment prior to acceptance.

c) The test plans and activities shall not relieve the BHS contractor from the obligations of providing work (materials, equipment, fabrication, construction and installation), meeting the requirements of the Contract Documents, and/or

promptly correcting deficiencies and maintain quality control measures for all parts of work (whether or not inspected or tested).

d) All normal airport operation bag processing shall continue without interruption.

3.5.2 Site Testing Support

3.5.2.1 General

a) The BHS contractor shall provide all labor and trades required to inspect both the mechanical and electrical systems of the baggage handling system with the Owner (or OAR), and Code Compliance inspector.

b) Additionally, the BHS contractor shall provide all required test equipment and technical support personnel to support the baggage handling system inspections.

c) At a minimum, the required test equipment shall include:

1. Laptop computers with applicable software & peripherals
2. Volt-Ohm Meter (VOM)
3. Clamp on type ammeter
4. Direct F.P.M. digital readout tachometer
5. Tape Measure
6. Stopwatch
7. Two-way radios and/or cell phones
8. Digital camera and/or video recording device

d) The BHS contractor shall also have appropriate service personnel on-site during the acceptance inspection, and testing periods to service or adjust, (as required), the baggage handling systems equipment.

e) The service personnel shall also open control boxes, control station covers, drive assembly chain/v-belt guards, covers, etc. for the Owner (or OAR) inspection of the baggage handling systems.

f) All material to be used for the load and rate tests, plus personnel to handle it, shall be provided by the BHS contractor.

g) The BHS contractor shall have a representative on site during all periods of the systems conditional acceptance, (as well as), final acceptance inspection and testing sessions.

3.5.2.2 Test Bags

a) The Contractor shall provide all test bags and testing material in bags. These test bags will be used in the Pre-TRR, and TRR testing phases.

b) The test bag set shall be mixed bags including but not limited to; totes, carry-on sized bags, soft sided bags, hard sided bags, garment bags, duffel bags, military-style duffel bags, and items that the TSA will test with, such as gun cases, coolers, etc.

c) The contractor supplied bag set must comprise the variety of types, materials, condition, and sizes seen during typical BHS operations, including bags with straps, wheels, handles, tags, etc. Tests run with an idealized bag set – for example, without handles or straps, or reinforced corners – will not be considered or accepted as valid.

d) Low profile tubs shall also be used during testing as appropriate for bags that would be placed in tubs as outlined in the tubing policy.

e) All test bags shall be clearly marked as test luggage. Alarm bags must be clearly identifiable as such on the outside of the bag.

f) Alarm bags shall have approved alarm simulant placed inside the bag, with three-inch metal two-digit numbers placed inside the bag to correspond with a permanent marked number on the outside of the bag.

g) Both Clear and Alarm bags shall be a mixed set of bags with no more than 30% of a similar type bag.

h) The BHS contractor shall coordinate the use of airport test tubs if explicitly permitted to do so, otherwise, the contractor shall provide tubs as required for testing. The contract shall not negatively impact operations when using airport tubs and replace any damaged airport tubs at no cost to the owner.

3.5.3 Site Testing Phases

3.5.3.1 Contractor Testing

a) After installation of the complete systems for each phase of the project, the BHS contractor shall perform all Electrical Inspections, Mechanical Inspections, and Functional Testing in accordance with the BHS contractor's approved test plan.

b) The BHS contractor shall perform an internal test run of the entire system prior to the actual acceptance test with the Owner (OAR) and submit a detailed report, after completion of the tests. The BHS contractor shall submit complete and accurate reports detailing the results of the BHS testing (as outlined in the approved Test Plan). The BHS test reports shall include up to date copies of all the electrical and mechanical static, dynamic and functional testing that was performed. Also provide the empirical data on each component.

c) The BHS contractor shall coordinate and perform all integration verification and testing required for the building security systems, fire systems and ATR. The BHS contractor shall certify all PLC/upper level network connections and provide reports for these tests upon completion.

d) All of the BHS non-compliance issues shall be individually identified with a narrative, describing the disposition and/or corrective actions of each. All debugging shall be complete prior to Owner (OAR) testing

e) Upon completion of all internal contractor testing, publish documentation and results of all tests, and inform Owner (or OAR) in writing as to the readiness of system.

3.5.3.2 Owner Testing

a) This test demonstration shall be conducted by the BHS contractor and witnessed by the Owner (or OAR) in accordance with the BHS contractor's approved BHS Test plans and the approved SSTP.

b) The BHS contractor shall demonstrate system testing in accordance with the approved BHS contractor's Test Plan to the Owner (or OAR). The Contractor shall have fully internally tested the system in the contractor testing phase and provided documentation of the test results to the owner (or OAR), i.e. no debugging during the owner testing.

c) All BHS Contractor's Pre-TRR testing (and retesting of failed tests) shall be carried out by the BHS Contractor, and witnessed by the Owner (or OAR), local TSA and their representatives, using the CBIS approved test plans – per Part 4, Section 4.5 (Testing and Acceptance) of this specification and the SSTP to certify that the BHS and In-Line CBIS passed per the pass/fail requirements of the test plans and is ready for a TRR by the TSA's OSC representative.

d) All testing data and related internal testing documentation that results from these tests, when passed, will be distributed by the Owner (or OAR) to the TSA's OSC representative, for review and approval, along with a request for a TRR.

3.5.4 BHS Inspection and Testing

3.5.4.1 General

a) The BHS contractor shall provide a test plan for each system, which shall (at a minimum), incorporate the requirements listed above in the Post-installation Testing section, and requirements per the Contract Documents.

b) Submit an Inspection, Functional Specification and Testing Program for the BHS to demonstrate compliance with all specified requirements. Prepare the inspection and test plans based on the information provided in corresponding drawings and specification.

c) The test plan shall include the static and dynamic test procedures, as specified. The BHS contractor shall also include in the test plan for each test performed:

1. All required personnel
2. Test luggage, counts and types
3. Induction points
4. Induction rates

5. Additional materials or tools
6. Reports used for documentation of the tests
7. Pass/Fail criteria of tests

d) After the completion of the baggage handling systems installation and debugging, the BHS contractor shall demonstrate to the Owner (or OAR) that the baggage handling systems meet all aspects of the Project specifications.

e) All BHS testing and “debugging” shall be complete prior to the demonstration of the systems during commissioning.

f) The BHS contractor shall perform a complete inspection of all the mechanical aspects of the systems and/or sub-systems.

g) The BHS contractor shall test the operation and functionality of the MDS. The operation and functionality of the PLC programming shall be tested using simulations for the baggage system operation prior to final installation and connection to the baggage system.

h) Perform a thorough inspection of the systems and make any adjustments to belts and/or controls (as required).

i) Check-out the system’s operational controls and safety devices (using bags, totes, or boxes).

j) Test the ability of the BHS to transport the required sizes and weights of baggage (through the conveyor systems), without jamming or toppling the baggage.

k) Test the capability to handle the required maximum baggage handling rates of the systems. The operating speed of each component of the systems shall be measured (using a standard device) and shall be recorded on the Equipment Description list.

l) Any component not operating within two percent (2%) of the design speed shall be replaced or reworked to bring it up to the design speed.

m) The BHS contractor shall provide at least 40 hours of continuous operation under no-load conditions followed by a complete system inspection for necessary corrections, and/or belt adjustments.

n) BHS inspections and tests listed below are required for the Owner (or OAR) approval.

1. Static Inspection:

   i. Mechanical
   ii. Electrical
   iii. Motor Control Panel

2. Dynamic Inspections:

i. Mechanical
ii. Electrical

3. Functional Inspections:

i. Start
ii. Manual Stop
iii. Autostop
iv. Cascade Stop
v. E-Stops
vi. Bag Jams
vii. Oversize
viii. Overload Trip
ix. Motor Safety Disconnect
x. Door Functions
xi. Other Basic Functions

3.5.4.2 Post-Installation Inspection

a) After the completion of the baggage handling systems installation, the BHS contractors shall provide (in writing) documentation of all performed and corrected static inspections. The BHS contractor shall use the provided static inspections form for each conveyor (or an equivalent approved form).

b) The corrected form shall demonstrate to the Owner (or OAR) that the delivered baggage handling systems meets all aspects of the Project specifications.

c) Prior to both the electrical and mechanical static inspections, the BHS contractor shall demonstrate that the BHS is safe and ready for inspection. This shall include all “Lock-out/Tag-out” procedures, and all E-Stop zones are operational and acceptable.

d) All discrepancies discovered during static inspections by the Owner (or OAR), or the Airport’s Safety Inspector shall be documented on the BHS Issues log.

e) The BHS contractor shall provide all labor and trades required to inspect both the mechanical and electrical systems of the baggage handling system with the Owner (or OAR).

f) Additionally, the BHS contractor shall provide all required test equipment, test bags and technical personnel to support the baggage handling system inspections.

g) The BHS contractor shall also have appropriate service personnel on-site during the acceptance inspection and testing period to service or adjust, (as required), the baggage handling system equipment.

h) The service personnel shall also open control boxes, control station covers, drive assembly chain/v-belt guards, covers, etc. for Owner (or OAR) inspection of the baggage handling system equipment.

i) The BHS contractor shall submit a test program for each system of each Project for compliance with above demonstration requirements.

j) The test program shall (at a minimum) incorporate the information contained in the conditional acceptance test and inspection documentation, presented in this section of the specification supplement, for the specified Project.

k) The BHS contractor shall be required to develop a test program for each system that shall identify and demonstrate all system control functions. The test program shall list each control station, control device, etc., and its related control function that shall be demonstrated and/or tested.

l) All tests witnessed by the Owner (or OAR) (both pass and fail) shall be assembled for submission (electronically and hard copy) to the Owner (or OAR) for review and approval.

3.5.4.3 Empirical Readings

a) The recorded information shall be considered as the system empirical readings. The empirical readings shall also be included, by the BHS contractor, in each of the O&M manuals for reference information.

b) The test program and system empirical readings information sheets presented within this section of the specification have been specifically developed for outbound baggage handling systems as an example of required information.

c) The test program shall include the recording of the following information per system, (during the inspection and testing of the systems). All actual speeds and motor currents shall be measured with the systems in a “no-load” condition.

1. Main Feeds:

   i. Fuse size per phase
   ii. Actual amperage per phase

2. Transformers:

   i. Fuse size per phase
   ii. Actual amperage per phase

3. Conveyor/Device Speed:

   i. Actual center line speed of conveyor/device

4. Motor Name Plate Data:

i. Manufacturer
ii. Horsepower
iii. Nameplate Motor Current
iv. Voltage
v. Phase
vi. Hertz
vii. Frame Size
viii. Type
ix. RPM
x. NEMA Design
xi. Service Factor
xii. Insulation Class
xiii. Insulation Type

5. Fuse or Circuit Breaker size per phase
6. Actual amperage per phase
7. Overload size or designation
8. Noise Level Test Results

3.5.4.4 No-Load Test 40 hour Run-in

a) The BHS contractor shall run all of the baggage handling systems' conveyors without a load for five (5) days, eight (8) continuous hours.

b) The speed of each conveyor shall be measured at twenty (20) minute intervals during the first and last hours.

c) If the actual speed does not meet the specified speed (+/-2%), the BHS contractor shall modify and/or adjust the drive unit, as required, to comply and repeat the test.

d) During this time, all the conveyors shall be inspected for abnormal noises, fluid leaks or any signs of poor operation.

e) After at least 40 hours of operation, the BHS shall be inspected for necessary corrections and/or adjustments by the contractor.

f) All associated conveyors shall be checked for proper belt tracking.

g) Adjustments shall be made for accurate tracking (as required).

3.5.4.5 Load Test

a) Prior to performing the load test, the contractor shall insure that all no-load tests have been performed and documented.

b) The contractor shall perform load tests for the BHS conveyors and document the results. The contractor shall be responsible to provide the load test ballast items in sufficient quantity to conduct all tests. Load test ballast handling and clean-up shall be the responsibility of the contractor.

c) For slope plate and makeup devices having multiple drives, the device shall be tested by starting the device from a stopped condition with both drives operating as well as operating on a single drive (for each drive).

d) Slope plate and makeup devices shall be run with the full load test weight for 1 hr while sampling and recording the amp readings on all phases every 15 minutes. The unit will operate with the number of drives expected to be in use under normal conditions for this test.

e) Ballast (weights) amount shall correspond to the design loads for the given equipment as define in this specification. Ballast shall be distributed along the conveyor evenly and not bind or catch anywhere on the equipment being tested. Ballast material utilized for load tests shall not damage, leak, spill, or create hazards to the equipment and local environment. Perishables shall not be used.

f) The load test tests shall verify that the amperage for each drive motor does not exceed the rated full load amperage (FLA). The measurement will be compared to the full load amperage indicated on the drive motor. All three phases (480v 3ph) shall be measured simultaneously and shall be consistent when tested.

g) The BHS contractor shall perform a load test for each system complying with the load requirements (identified herein).

1. The BHS load tests shall be performed on the final complete systems. The BHS contractor shall provide the load test demonstration immediately following the 40 hour no-load test.
2. All amp readings shall be recorded from the load side of the starter on non-VFDs. On VFDs, the amp reading shall be taken from the load side of the VFD.
3. Prior to load testing, BHS contractor shall be required to provide Owner (or OAR) with a complete motor manifest showing no-load amps along with their respective belt speeds.
4. All load tests shall be performed prior to operational use of conveyors. All amp readings shall be conducted and recorded with weight using load specified.

h) The BHS contractor shall submit in writing to the Owner (or OAR) all No-Load Amp readings after the 40-hour no-load test has been completed and a minimum of two (2) business days prior to conducting the BHS system load test.

3.5.4.6 Mechanical Static Inspections

a) Provide a comprehensive, easy to read mechanical equipment inspection plan for every piece of mechanical equipment installed as part of the BHS

b) The following is intended to be a guideline and is not to be construed as all-inclusive. This inspection plan shall verify adherence to the Specification for the following items:

<u>Belt Conveyors (Mechanical):</u>

1. Gaps between adjacent head and tail pulleys
2. Vertical clearance
3. Angle of incline/decline
4. 4" Conveyor I.D.
5. Gaps between adjacent bed sections
6. Gaps between adjacent side guard sections
7. Baggage snag points
8. Sharp edges or shear burrs
9. Condition of painted surfaces
10. Tightness of all hardware
11. Alignment of stainless steel trim and bed section filler plate
12. Spacing of vertical braces for side guards and back guards
13. Spacing of conveyor supports
14. Sway bracing
15. Trim securement
16. Screw type and countersinking
17. Safety guarding
18. Belly pans
19. Anchoring and mounting of access ladders
20. Installation of right angle transfer transition plate
21. Belting material and splicing
22. Belt lacing size and cable
23. 1" V-notch in belting splice
24. Belt path routing
25. Belt wrap
26. Belt tension
27. Pulley diameter
28. Pulley shaft diameter
29. Vertical alignment of head and tail pulleys
30. Lateral position of pulleys
31. Return roller diameter
32. Return roller spacing
33. Bearing mounting lock washers
34. Bearing jacking bolts
35. Bearing grease zerk removal
36. Bearing caps
37. Motor and speed reducer mounting lock washers
38. Speed reducer drip pan
39. Motor/speed reducer related sprocket/sheave and shaft alignment

40. Motor/speed reducer related sprocket or sheave key tightness
41. Motor/speed reducer related chain/V-belt tension
42. Chain/V-belt safety guard
43. Speed reducer leakage
44. Speed reducer lubrication level
45. Mounting of speed reducer torque arm
46. Safety finger guards on end pulleys at staffed conveyors
47. 25% take-up pulley position
48. Installation of strip door type draft curtain
49. Installation of fire/security doors
50. Removal of construction related debris
51. Maintenance access
52. Protective guard railing installation
53. Vertical clearance for traffic aisles.

<u>High Speed Paddle Diverters:</u>

1. Gaps between adjacent bed sections
2. 4" ID - Gaps between adjacent side guard sections
3. Baggage snag points
4. Sharp edges or shear burrs
5. Condition of painted surfaces
6. Mounting and anchoring of diverter assembly
7. Tightness of all hardware
8. Bearing mounting lock washers
9. Bearing grease zerk removal
10. Motor and speed reducer mounting lock washers
11. Speed reducer drip pan
12. Motor/speed reducer related sheave/shaft alignment
13. Motor/speed reducer related sheave key tightness
14. Motor/speed reducer related chain/V-belts tension
15. Diverter safety guard
16. Speed reducer oil leaks
17. Speed reducer lubrication level
18. Mounting of speed reducer torque arm
19. Removal of construction debris
20. Maintenance access
21. Alignment of diverter blade/paddle
22. Alignment and secureness of diverter blade/paddle pad
23. Diverter blade/paddle face sweeper.

<u>Vertical Sort Unit</u>

1. Gaps between adjacent bed sections
2. 4" sorter ID
3. Gaps between adjacent side guard sections

4. Baggage snag points
5. Sharp edges or shear burrs
6. Condition of painted surfaces
7. Mounting and anchoring of sorter assembly
8. Tightness of all hardware
9. Bearing mounting lock washers
10. Bearing grease zerk removal
11. Motor and speed reducer mounting lock washers
12. Speed reducer drip pan
13. Motor/speed reducer related sheave/shaft alignment
14. Motor/speed reducer related sheave key tightness
15. Motor/speed reducer related
16. Chain/V-belts tension
17. Sorter safety guard
18. Speed reducer leaks
19. Speed reducer lubrication level
20. Mounting of speed reducer torque arm
21. Removal of construction debris
22. Maintenance access

<u>Incline Plate/Slope Pallet Devices:</u>

1. Vertical clearance above plates/pallets
2. Gaps between adjacent back guard sections
3. Gap between perimeter finger guard and top of pallet not in excess of 1/8"
4. Skirting above and below device conveying surface
5. Sharp edges or shear burrs
6. Condition of painted surfaces
7. Tightness of all hardware
8. Trim securement screw type and countersinking
9. Baggage snag points
10. Drive assembly safety guarding
11. Speed reducer drip pan
12. Motor/speed reducer type and alignment
13. Motor-driven sprockets/sheaves alignment
14. Motor-driven chain/V-belt tension
15. Speed reducer oil leakage
16. Removal of construction debris
17. Maintenance access
18. Protective guard railing
19. Pallet-driving sprocket alignment
20. Pallet-driving chain tightness.

<u>ATR/BMA:</u>

1. Array I.D
2. Vertical and lateral clearances
3. Baggage snag points
4. Sharp edges or shear burrs
5. Condition of painted surfaces
6. Proper anchoring of scanner array framework
7. Scanner support/mounting hardware tightness and lock washers
8. Maintenance access
9. ATR Bottom heads blower motors support/mounting hardware tightness.

3.5.4.7 Electrical Static Inspection

a) Provide a comprehensive, easy to read electrical equipment inspection plan. For the determination of terminal tightness, all terminals in motor control panels or field mounted devices shall be tightened to the manufacturer's recommended torque specifications utilizing a certified calibrated torque wrench or approved equal tool.

b) The BHS contractor shall be required to demonstrate to the Owner (or OAR) that the screws are set at the proper torque value and the BHS contractor shall include this information in the below referenced electrical static inspection reports.

c) This inspection plan shall verify adherence to the Specification for the following items:

<u>Motor Control Panels</u>:

1. I.D. information for MCP and all devices contained within
2. Control station I.D./function tags
3. Illuminated push button switch protective guard ring
4. Location of control devices
5. Tightness of all hardware
6. Control circuit wiring size, type, color, and number tag
7. Power circuit wiring size, type, color, and number tag
8. Wire "whiskers" at terminal points
9. Wiring terminal point screw tightness
10. Panduit wire raceway
11. Splices in Panduit wire raceway
12. Panduit wire raceway covers installed
13. Conduit routing and mounting
14. Tightness of conduit fittings
15. Conduit bushings and chase nipples
16. "Air-space" around programmable logic controllers
17. MCP doors mechanical safety interlock
18. Safety shield over line and load terminals of MCP main breaker/fuses

19. Actual BHS orientation on status panel
20. Restraint clips for plug-in type power supply
21. Installation of hour meter and I.D. tag.

Belt Conveyors:

1. Control station I.D./function tags
2. Control station accessibility/location
3. Disconnect switch accessibility/location
4. Illuminated push button switch protective guard ring
5. Tightness of all hardware
6. Photoeye and/or limit switch mounting
7. Encoder mounting and coupling
8. Control circuit wiring size, type, color, and number tag
9. Power circuit wiring size, type, color, and number tag
10. Wire "whiskers" at terminal points
11. Wiring terminal point screw tightness
12. No splice point wire nuts within junction boxes
13. Conduit routing and mounting
14. Tightness of conduit and sealtite fittings
15. Junction box covers installed
16. Unused openings in junction boxes or control device boxes
17. Motor Safety Disconnect switch lockout capability
18. Lanyard cable supports and cord switch mounting
19. Maintenance access
20. Record motor name plate data
21. Record size of motor overload heaters
22. Record size of all fuses

High Speed Paddle Diverters:

1) Control station ID/function tags
2) Control station and disconnect switch accessibility/location
3) Illuminated divert button switch protective guard ring
4) Tightness of all hardware
5) Photocell mounting
6) Tach mounting and coupling
7) Control circuit wiring size, type, color, and number tag
8) Power circuit wiring size, type, color, and number tag
9) Wire "whiskers" at terminal points wiring terminal point screw tightness
10) Splice point wire nuts within junction boxes
11) Conduit routing and mounting
12) Tightness of conduit/sealtite fittings
13) Junction box covers
14) Unused openings in junction boxes or control device boxes
15) Safety disconnect switch lockout capability

16) Lanyard cable supports and limit switch maintenance access
17) Record motor name plate data, size of motor

Vertical Sort Unit:

1. Control station ID/function tags
2. Control station and disconnect switch accessibility/location
3. Illuminated push button switch protective guard ring
4. Tightness of all hardware
5. Photocell mounting
6. Tach mounting and coupling
7. Control circuit wiring size, type, color, and number tag
8. Power circuit wiring size, type, color, and number tag
9. Wire "whiskers" at terminal points
10. Wiring terminal point screw tightness
11. Splice point wire nuts within junction boxes
12. Conduit routing and mounting
13. Tightness of conduit/Sealtite fittings
14. Junction box covers
15. Unused openings in junction boxes or control device boxes
16. Safety disconnect switch lockout capability
17. lanyard cable supports and limit switch
18. Maintenance access
19. Record motor name plate data, size of motor overload heaters, and size of all fuses.

ATR/BMA:

1. Scanner: ID tags
2. Tightness of all hardware
3. Control circuit wiring size, type, color, and number tag
4. Tightness of scanner cable connections
5. Power circuit wiring size, type, color, and number tag
6. Wire "whiskers" at terminal points
7. Wiring terminal point screw tightness
8. Splice point wire nuts within junction boxes
9. Conduit routing and mounting
10. Tightness of conduit/sealtite fittings
11. Junction box covers
12. Unused openings in junction boxes or control device boxes
13. Bottom heads blower motors conduit routing and mounting
14. Maintenance access.

Flat Plate / Slope Pallet Devices:

1. Control station and disconnect switch accessibility/location
2. control station ID/function tags

3. Illuminated pushbutton switch protective guard ring
4. Tightness of all hardware
5. Photocell mounting
6. Control circuit wiring size, type, color, and number tag
7. Power circuit wiring size, type, color, and number tag
8. Wire "whiskers" at terminal points
9. Wiring terminal point screw tightness
10. Splice point wire nuts within junction boxes
11. Conduit routing and mounting
12. Tightness of conduit/sealtite fittings
13. Junction box covers
14. Unused openings in junction boxes or control device boxes
15. Safety disconnect switch lockout capability
16. Maintenance access
17. Record motor name plate data, size of motor overload heaters, and size of all fuses.

3.5.4.8 Mechanical Dynamic Inspections

a) Provide a comprehensive, easy to read mechanical test plan. This test plan, at a minimum, shall verify the specified functionality of the following:

b) Belt Conveyors:

1. Conveyor speed
2. Belt tracking
3. Shaft run-out on pulleys
4. Excessive vibration
5. Operation of clutch/brake units
6. Lateral movement of speed reducer on shaft during start/stops
7. Abnormal noises
8. Torsion flexing of drive assembly during start/stop operation
9. Operation of controls

3.5.4.9 Functional Testing

a) The BHS contractor is required to develop and execute an approved test plan for each system to identify and demonstrate all the System Control Functions.

b) The test plan shall list each Control Station, Control Devices, etc., and its related control function that shall be demonstrated and/or tested (in a checklist format) with “Pass” and “Fail” check boxes, the date, and the recorder’s initials (for each item).

c) Any item that fails during a test shall be re-tested (after corrections are made) and another checklist shall be used in the test recording of the previously failed items.

d) The BHS contractor shall provide the Owner (or OAR) with all checklists produced during testing. The functional test plan shall be provided in both hard copy for field use during the testing process and a completed copy in (based upon acceptance testing) electronic ".pdf" format.

e) The BHS contractor shall provide a comprehensive, easy to read functional test plan that clearly identifies the following at a minimum:

1. All installed control devices
2. The control device locations in the BHS
3. The function of the control devices
4. All conveyors affected by the control devices
5. Security/Fire Door functions
6. The expected field result with applicable system monitor message and/or display.
7. Photoeyes and/or limit switches
8. Status lights
9. Start-up alarms
10. Fault warning alarms
11. Fault warning alarms with multiple faults
12. Fault warning alarm silence button
13. Motor overloads
14. Motor disconnects
15. Auto start
16. Auto shut-down
17. Manual stop
18. E-Stop function
19. Cascade operation
20. Overheight/Overlength function
21. Jam function

3.5.5 Test Failure

a) A BHS test failure (during any test period) shall be defined as any design characteristic or malfunction of the BHS contractor's provided equipment or materials that damages baggage or reduces any operating rate below those specified.

b) Any conditions resulting from improper loading of the baggage or loading baggage of sizes not included in the specification requirements shall not be considered as failures.

c) At the discretion of the Owner (or OAR), a test failure may result in a 24-hour suspension of further testing until document of corrections made to the system and a passed test has been presented to the Owner (or OAR).

3.5.6 Test Documentation

a) The test program shall be organized by test in a three (3) ring binder, and also provided in ".pdf" format, and submitted by the BHS contractor for Owner (or OAR) review and approval at least 21 days prior to owner testing.

b) All executed (passed or failed) tests shall be documented in the test plan forms. All test documentation shall be submitted to the Owner (or OAR) for their review seven (7) days after test completion. This information shall be organized in a three (3) ring binder by test, date, results, associated reports, etc. Electronic media (".pdf" format) may be accepted if approved by Owner (or OAR) and presented in a similar manner as organized above.

c) The BHS contractor shall record the test data on the "Test Record Forms" and furnish two (2) copies to the Owner (or OAR) prior to final acceptance.

d) The final BHS dynamic and static test results shall be included in the final O & M manuals for reference information.

3.5.7 Conditional Acceptance

3.5.7.1 Conditional Acceptance Requirements

a) Conditional acceptance for each baggage handling system or phase shall only be considered after the following are successfully completed:

1. All Operations and Maintenance training specified for Airport personnel has been completed.
2. The final Operation and Maintenance (O&M) manuals have been delivered to the Owner (or OAR).
3. All spare parts (that were purchased by the Owner) for the subsystem or phase, have been delivered.
4. All equipment or special tools required for maintenance (that were purchased by the Owner) have been delivered.

b) Provide the names, addresses and 24-hour phone numbers of representatives who have the authority and experience to make immediate replacements and repairs for the full life of all BHS warranties.

c) The BHS (including all upper and lower level controls) shall demonstrate compliance with the approved Test Plan. Any system deficiencies (punch list items) shall be corrected before performing the subsequent inspections or tests.

d) When the specified inspections and testing are successfully completed, the Owner (or OAR) shall issue a written "Notice of Conditional Acceptance".

1. The associated "Conditional Acceptance" status shall indicate that the Owner (or OAR) has approved the equipment (as worthy for operational use).

2. The “Conditional Acceptance” shall not relieve the responsibility for maintenance, insurance and/or security on the associated baggage system.
3. The “Conditional Acceptance” shall in no way relieve the responsibility for performing all the work set forth in the Contract Documents.
4. At the time of “Conditional Acceptance”, the amount of retention held until issuance of a “Certificate of Final Acceptance” shall be a summation of a predetermined percentage of the total value of the Project, and the assessed value of any open punch list items (to be determined by the Owner).

e) “Conditional Acceptance” is applicable to each baggage handling system, or construction phase, and shall be issued in writing by the Owner (or OAR), prior to commencement of subsequent construction phases. “Final Acceptance” of individual construction phases or subsystems shall not apply.

3.5.7.2 Conditional Acceptance Operational Period

a) Upon the issuance of a “Certificate of Conditional Acceptance”, a 30 day “Operational Period” shall commence. The Owner shall put all the associated systems into on-line operations, processing the daily flow of baggage.

b) During this 30 day “Operational Period”, the BHS contractor shall provide full-time technical site representation during the actual hours of operation, with a minimum of 16 hours per day, seven (7) days per week for the first 14 days. The BHS contractor shall be responsible to provide reports required per PGDS to the TSA during this timeframe, either on site or remotely connected.

c) The BHS contractor shall ensure that the representatives shall be capable, and duly qualified, to provide service for any problems that may be encountered, which occur during this period.

1. The BHS contractor shall have one (1) qualified person per shift (at a minimum) to troubleshoot and immediately resolve any problems which may arise.
2. The BHS contractor’s on-site personnel shall be capable of troubleshooting and resolving all mechanical, electrical and controls related issues.

d) During the 30 day “Operational Period”, the BHS contractor shall be responsible for all maintenance and operational issues, required on the BHS. During this time period, the BHS contractor shall be responsible for ensuring that the BHS is fully functional during all Airport operational hours.

e) If any downtime occurs (during these hours) due to major faults in the BHS (i.e. PLC fault, motor overloads, etc.) the BHS contractor shall be responsible for immediate rectification and assisting the Owner, so that operations is not impacted in any way.

f) During the 30 day “Operational Period”, it shall also be the responsibility of the BHS contractor to keep a detailed computer log, (as detailed in the Submittal Requirements of this specification).

g) If a problem occurs (within the BHS), after the Owner has elected to not require full-time technical site representation after the 30 day “Operational Period”, the BHS contractor shall supply the names, addresses and 24-hour phone numbers of technical representatives that can be contacted (who have the authority and experience) to make immediate rectifications or recommendations, and assist the Owner or the Owner’s maintenance contractor to return the system to a fully functional on-line state (in the shortest possible time frame).

h) If site representation is deemed unnecessary, (at the Owners discretion) it shall be discontinued, and the Owner shall receive a pro-rated credit.

3.5.8 Final Acceptance

a) “Final Acceptance” of the BHSs shall only be considered after all the systems have conformed to the “Conditional Acceptance” terms, and all phases have successfully completed the 30 day “Operational Period”, and the following criteria is met:

b) The BHS has not experienced any repeated repairs and adjustments, and is achieving the specified rate, accuracy and availability standards (as required by this specification).

c) The BHS has successfully completed the specified Inspections and testing, with no outstanding punch list items.

d) The BHS is in full compliance with the Contract Documents.

e) The Owner and all other governing agencies have made their inspections and given their approvals.

f) “Certificates of Installation Compliance” have been issued to the Owner (or OAR).

g) Warranties for all associated materials and equipment received from Subcontractors and Suppliers have been provided to the Owner.

h) The Owner’s purchased spare parts and tools audit has been conducted.

i) All purchased tools have been turned over to the Owner (or OAR).

j) All spare parts purchased by the Owner (or OAR) have been delivered.

k) The PLC and source codes for all programs in the BHS computer system have been provided to the Owner (or OAR).

l) Accurate "As-built" drawings and manuals (as specified herein) have been delivered to the Owner (or OAR).

m) All BHS Operation and Maintenance training has been completed and approved by the Owner (or OAR).

3.6 OPERATIONS AND MAINTENANCE TRAINING

3.6.1 Scheduled BHS Training

a) Prior to the “Conditional Acceptance” of the baggage handling system, BHS contractor shall provide the following training to Owner (or OAR), and appropriate Airline Personnel.

1. “Operations Training” shall consist of 20 hours of training for the Airline carriers, and Owner staff to cover the operational functions of all systems and all pertinent sections of the Operations and Maintenance manual.

   I. Training sessions shall be conducted in two (2) sessions, (AM and PM) to allow maximum participation for shift personnel.
   II. All training sessions shall be professionally recorded on video tape (or digital recorder), with voice over narration by the BHS contractor. The Owner shall receive two (2) DVD’s of the “Operations Training” sessions.
   III. The training sessions shall be organized, using presentation materials, handouts, power point presentations and other training tools to thoroughly demonstrate and explain the operational, controls and reporting characteristics of the system.

2. “Maintenance Training” shall consist of 20 hours of training, including "classroom" and "hands-on" type programs. "Hands-on" training includes actual troubleshooting, adjustment of equipment, and component removal and/or replacement.

   I. Training sessions shall be conducted in two (2) sessions, (AM and PM) to allow maximum participation for shift personnel.
   II. All training sessions, classroom and hands-on, shall be professionally recorded on video tape (or digital recorder) with voice over narration by the BHS contractor. The Owner (or OAR) shall receive two (2) DVD’s of the “Maintenance Training” sessions.
   III. The training sessions shall be organized, using presentation materials, handouts, power point presentations and other training tools to thoroughly demonstrate and explain the routine and periodic maintenance required, including component removal and/or replacement on the system.

3.6.2 Supplemental Training

a) Should the Owner (or OAR) require supplemental training beyond that specified above, it shall be provided by BHS contractor at a time and at rates as mutually agreed upon between Owner (or OAR) and the BHS contractor.

3.7 RESPONSIBILITY MATRIX

BHS / CBIS RESPONSIBILTY MATRIX				
Item No	**Description of Task to be Provided**	**Primary Responsibility**	**Support Responsibility**	**Coordination Responsibility**
EDS EQUIPMENT				
1	EDS Equipment	EDS Supplier	EDS Supplier	TSA
2	EDS Equipment Factory Acceptance Test	TSA	EDS Supplier	TSA
3	EDS Shipment to Airport	TSA (Logistics Contractor)	EDS Supplier	TSA Site Lead / Local TSA / TSA's Logistics Contractor / EDS Supplier
4	EDS Rigging, Unloading and On Site placement	EDS Supplier	EDS Supplier	TSA Site Lead / TSA (Integration Contractor) / Local TSA
5	EDS – UPS Equipment	EDS Supplier	Electrical Contractor Division 26 00 00	TSA Site Lead / EDS Supplier
6	EDS – UPS Equipment Unloading and On Site placement	Electrical Contractor Division 26 00 00	EDS Supplier	Airport OAR / EDS Supplier
7	EDS - Equipment Protection (After On-Site Placement)	General Contractor Division 01 35 00	General Contractor Division 01 35 00	TSA Site Lead / EDS Supplier
8	EDS – Electrical Power Connection to EDS & UPS Equipment	Electrical Contractor Division 26 00 00	EDS Supplier	EDS Supplier & General Contractor
9	EDS – Communication / data cabling (between EDS and OSR/Server Room). Patch panel to patch panel	Comm. Contractor under Division 27 00 00	Comm. Contractor under Division 27 00 00	EDS Supplier & Airport OAR
10	Voice Phones at EDS	Comm. Contractor Division 27 00 00	Comm. Contractor Division 27 00 00	EDS Supplier & Airport OAR
11	EDS Spare Parts for EDS machines	EDS Supplier and Local TSA	EDS Supplier	EDS Supplier
OSR EQUIPMENT				
12	Furnish and Install OSR – CI & PVS Workstations (Including Monitor, Keyboard, Mouse) and Image Report Printers for Control Room	EDS Supplier	EDS Supplier	TSA Local / Airport OAR / TSA's Integration Contractor
13	TSA / OSR Control Room	General Contractor Division 01 35 00	General Contractor Division 01 35 00	Airport OAR
14	TSA / OSR Control Room Console (millwork) & Chairs	General Contractor Division 01 35 00	General Contractor Division 01 35 00	Airport OAR / EDS Supplier / Local TSA

BHS / CBIS RESPONSIBILTY MATRIX				
Item No	**Description of Task to be Provided**	**Primary Responsibility**	**Support Responsibility**	**Coordination Responsibility**
15	TSA / OSR Control Room Communication voice and Data cabling from Server / Telecom Rooms	Comm. Contractor Division 27 00 00	Comm. Contractor Division 27 00 00	Local TSA / Airport OAR
16	BHS Remote Status Monitors plus TSA's Remote Status Monitors in CBRA and OSR	BHS Contractor Division 34 77 16	BHS Contractor Division 34 77 16	Airport OAR & Local TSA
17	Remote EDS Control Panel and Display	EDS Supplier	EDS Supplier	Local TSA / Airport OAR
18	CCTV Camera Feeds for BHS / EDS	Elec Security and Safety Contractor Division 34 77 16	Elec Security and Safety Contractor Division 34 77 16	Airport OAR
19	TSA CBRA, OSR and Office area Access Control and Video Surveillance System	Elec Security and Safety Contractor Division 34 77 16	Elec Security and Safety Contractor Division 34 77 16	Airport OAR / Local TSA
CBRA AND RELATED EQUIPMENT				
20	Checked Baggage Resolution Area (CBRA)	General Contractor Division 01 35 00	BHS Contractor Division 34 77 16 / EDS Supplier	Local TSA / Airport OAR
21	ETD equipment Furnish and Install	ETD Supplier	Local TSA	Local TSA / Airport OAR
22	Electrical Power, Voice, and Data Cabling at Checked Baggage Resolution Area (CBRA)	Electrical Contractor Division 26 00 00 & Comm. Contractor Division 27 00 00	Electrical Contractor Division 26 00 00 & Comm. Contractor Division 27 00 00	Local TSA / Airport OAR
23	Supply of ETD Tables and associated knee walls	BHS Contractor Division 34 77 16	General Contractor Division 01 35 00	Airport OAR / EDS Supplier
24	ETD Table Modification Kit for SVS	BHS Contractor Division 34 77 16	General Contractor Division 01 35 00	Airport OAR / EDS Supplier
25	Installation of ETD Tables, associated kneewalls and modification kits for SVS	BHS Contractor Division 34 77 16	General Contractor Division 01 35 00	Airport OAR / EDS Supplier
26	Furnish and Install Secondary Viewing Stations (SVS) and Image Display Printers for Checked Baggage Resolution Area (CBRA)	EDS Supplier	EDS Supplier	Local TSA / Airport OAR
27	SVS Mounting	Electrical Contractor Division 26 00 00 & Comm. Contractor Division 27 00 00	EDS Supplier / General Contractor Division 01 35 00	Local TSA / Airport OAR

BHS / CBIS RESPONSIBILTY MATRIX				
Item No	**Description of Task to be Provided**	**Primary Responsibility**	**Support Responsibility**	**Coordination Responsibility**
28	EDS Network / SVS Integration with BHS	BHS Contractor Division 34 77 16 / EDS Supplier	BHS Contractor Division 34 77 16 / EDS Supplier	Airport OAR / EDS Supplier
29	Handheld Barcode Reader for PTRI	BHS Contractor Division 34 77 16	EDS Supplier	Local TSA / Airport OAR
30	Workstation at Alarm conveyor lines	BHS Contractor Division 34 77 16		
31	BHS Bag Status Displays	BHS Contractor Division 34 77 16	BHS Contractor Division 34 77 16	Local TSA / Airport OAR
32	Checked Baggage Resolution Room (CBRA) MUFIDS Display (If Applicable)	Comm. Contractor Division 27 00 00	Comm. Contractor Division 27 00 00	Local TSA / Airport OAR
BHS RELATED EQUIPMENT				
33	BHS design, fabrication, installation & testing	BHS Contractor Division 34 77 16	BHS Contractor Division 34 77 16	TSA / OSC / Local TSA / EDS Supplier / Airport OAR
34	BHS Integration with EDS	BHS Contractor Division 34 77 16	EDS Supplier & General Contractor Division 01 35 00	TSA / Airport OAR
35	BHS/EDS Integrated System Training	BHS Contractor Division 34 77 16 and EDS Supplier	EDS Supplier	Local TSA / Airport OAR
36	BHS Server Room	General Contractor Division 01 35 00	General Contractor Division 01 35 00	Airport OAR
37	Electrical Power to UPS in Server Rooms	Electrical Contractor Division 26 00 00	Electrical Contractor Division 26 00 00	Airport OAR
BHS CONTROL ROOM (If Applicable)				
38	Door Security to Control Center and adjacent rooms / offices	Elec Security and Safety Contractor Division 34 77 16	Elec Security and Safety Contractor Division 34 77 16	Airport OAR
39	Control Center Wall HMI Monitors for BHS	BHS Contractor Division 34 77 16	BHS Contractor Division 34 77 16	Airport OAR
40	Control Center Wall Monitors for CCTV	Elec Security and Safety Contractor Division 34 77 16	Elec Security and Safety Contractor Division 34 77 16	Airport OAR
41	Control Center CCTV Control Station	Elec Security and Safety Contractor Division 34 77 16	Elec Security and Safety Contractor Division 34 77 16	Airport OAR
42	Control Center BHS Operator Workstations	BHS Contractor Division 34 77 16	BHS Contractor Division 34 77 16	Airport OAR
43	Control Center Supervisor & Manager Workstations	Airport Mgt.	Airport Mgt.	Airport Mgt.

BHS / CBIS RESPONSIBILTY MATRIX				
Item No	**Description of Task to be Provided**	**Primary Responsibility**	**Support Responsibility**	**Coordination Responsibility**
44	Control Center Work Order Coordinator Workstations	Airport Mgt.	Airport Mgt.	Airport Mgt.
45	Document Library Record Storage Employee Training Workstation	Airport Mgt.	Airport Mgt.	Airport Mgt.
46	Electrical Power, Voice, and Data Cabling in Control Center and adjacent rooms (other than those supplied under Division 34 77 16)	Comm. Contractor Division 27 00 00	Comm. Contractor Division 27 00 00	Airport OAR
47	Electrical Power to Workstations and Monitors in Control Center (supplied under Division 34 77 16)	BHS Contractor Division 34 77 16	BHS Contractor Division 34 77 16	Airport OAR
48	Control Center Consoles (millwork), & desks, shelving, file cabinets, printer stand & chairs in Control Center, Conference Room, JBT Office and Document Library Record Storage Room	General Contractor Division 01 35 00	General Contractor Division 01 35 00	Airport OAR
TESTING AND COMMISSIONING				
49	EDS / BHS Integration, Startup and Test Support, including TRR and iSAT support	EDS Supplier – for EDS side & BHS Contractor Division 34 77 16 for BHS/CBIS side	EDS Supplier – for EDS side & BHS Contractor Division 34 77 16 for BHS/CBIS side	Airport OAR / TSA Site Lead
50	Development of the Site Specific Test Plan (SSTP)	BHS Contractor Division 34 77 16	BHS Contractor Division 34 77 16 / EDS Supplier	Airport OAR / TSA Site Lead
51	EDS Detection SAT	EDS Supplier	BHS Contractor Division 34 77 16 / EDS Supplier	Airport OAR / TSA Site Lead / Local TSA
52	Pre-ISAT / Pre-TRR	BHS Contractor Division 34 77 16	EDS Supplier – for EDS side & BHS Contractor Division 34 77 16 for BHS/CBIS side	Airport OAR / TSA Site Lead
53	Test Readiness Review	TSA (Office of Security Capabilities) & EDS Supplier	BHS Contractor Division 34 77 16 / EDS Supplier	Airport OAR / TSA Site Lead / Local TSA
54	Integrated Site Acceptance Testing	TSA (Independent Verification and Validation Contractor)	BHS Contractor Division 34 77 16 / EDS Supplier	Airport OAR / TSA Site Lead / Local TSA

BHS / CBIS RESPONSIBILTY MATRIX				
Item No	**Description of Task to be Provided**	**Primary Responsibility**	**Support Responsibility**	**Coordination Responsibility**
O&M AND TRAINING				
55	EDS, Multiplexing, OSR Equipment Maintenance	EDS Supplier	EDS Supplier	Local TSA

END OF SECTION 34 77 39